

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:	Philyaw	
Application Serial No.:	09/659,520	Confirmation No.: 6222
Filing Date:	September 12, 2000	
Group:	2143	
Examiner:	Phuoc H. Nguyen	
Title:	LAUNCHING A WEB SITE USING A PERSONAL DEVICE	

BRIEF ON APPEAL

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Appendices:

- A. U.S. Patent No. 6,446,871 to Buckley et al.
- B. U.S. Patent No. 5,903,225 to Schmitt et al.
- C. *KSR International Co. v. Teleflex Inc., et al.*, 127 S. Ct. 1727 (2007).

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This Brief is submitted in accordance with 37 C.F.R. § 41.67 concerning the Notice of Appeal filed February 26, 2007 in response to the Final Office Action dated May 24, 2006, wherein the Examiner finally rejected claims 1-37 that comprise all of the pending claims in this application.

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- U.S. Patent Application Serial No. 09/494,924 entitled “INPUT DEVICE FOR ALLOWING INTERFACE TO A WEB SITE IN ASSOCIATION WITH A UNIQUE INPUT CODE” (Atty. Dkt. No. PHLY-24,913), filed on February 1, 2000;
- U.S. Patent Application Serial No. 10/884,377 entitled “OPTICAL READER WITH ULTRAVIOLET WAVELENGTH” (Atty. Dkt. No. PHLY-26,826) filed on July 2, 2004; and
- U.S. Patent Application Serial No. 09/382,421 entitled “COMBINED PRODUCT CODE AND INSIGNIA FOR SIGNIFYING AN INTERNAL INTERACTIVE CODE” (Atty. Dkt. PHLY-24,740) filed on August 24, 1999.

Appellants have filed Notices of Appeal in the following related applications:

- U.S. Patent Application Serial No. 09/382,374 entitled “METHOD AND APPARATUS FOR ALLOWING A BROADCAST TO REMOTELY CONTROL A COMPUTER” (Atty. Dkt. No. PHLY-24,736), filed on August 24, 1999;
- U.S. Patent Application Serial No. 09/382,423 entitled “METHOD AND APPARATUS FOR UTILIZING AN AUDIBLE SIGNAL TO INDUCE A USER TO SELECT AN E-COMMERCE FUNCTION” (Atty. Dkt. No. PHLY-24,739), filed on August 24, 1999;
- U.S. Patent Application Serial No. 09/417,863 entitled “SOFTWARE DOWNLOADING USING A TELEVISION BROADCAST CHANNEL” (Atty. Dkt. No. PHLY-24,767), filed on October 23, 1999;
- U.S. Patent Application Serial No. 09/659,170 entitled “ACCESSING A VENDOR WEB SITE USING PERSONAL ACCOUNT INFORMATION RETRIEVED FROM A CREDIT CARD COMPANY WEB SITE” (Atty. Dkt. No. PHLY-25,340), filed on September 11, 2000;

- U.S. Patent Application Serial No. 09/602,034 entitled “CONTROLLING A PC USING A TONE FROM A CELLULAR TELEPHONE” (Atty. Dkt. No. PHLY-25,337), filed on June 23, 2000;
- U.S. Patent Application Serial No. 09/382,372 entitled “METHOD AND APPARATUS FOR MATCHING A USER'S USE PROFILE IN COMMERCE WITH A BROADCAST” (Atty. Dkt. No. PHLY-24,738), filed August 24, 1999;
- U.S. Patent Application Serial No. 09/642,891 entitled “RETRIEVING PERSONAL ACCOUNT INFORMATION FROM A WEB SITE BY READING A CREDIT CARD” (Atty. Dkt. No. PHLY-25,338), filed on August 21, 2000.

The above-identified patent application has no related interferences.

III. Status of the Claims.

Claims 1-37 from the application are pending, stand firmly rejected, and are on appeal here. A complete and current listing of Claims 1-37 are attached here in the **CLAIMS APPENDIX**.

IV. Status of Amendments.

Appellants filed an Amendment and Response to Office Action on May 30, 2006 in response to the Office Action, mailed November 30, 2005 which was entered, attached hereto as Exhibit E. Appellants received a Final Office Action, mailed August 24, 2006 in response. Appellants filed a Notice of Appeal on February 26, 2007.

V. Summary of the Claimed Subject Matter.

The present invention, as set forth in independent Claim 1, relates to a method of displaying a web page to a user. The method comprising the steps of providing a triggering device having a unique code associated therewith that uniquely identifies the triggering device,¹ the unique code associated with a remote location on a network that comprises the source of the

¹ See Specification, reference number 2500 on Figure 25; page 45, lines 24-28; page 46, lines 20-22; and page 47, lines 1-6.

web page,² and the unique code having no location information contained therein.³ The method includes transmitting the unique code from the triggering device to an interface system,⁴ the interface system disposed on the network at a triggering location.⁵ The method further includes retrieving location information associated with the unique code from a database,⁶ the location information corresponding to the location of the web page at the remote location on the network.⁷ The method further includes in response to retrieving the location information, connecting the interface system to the remote location.⁸ The method further includes presenting the web page corresponding to the location information of the remote location to the user via the interface system.⁹

The present invention, as now set forth in dependent Claim 2, relates to a method of Claim 1, wherein the triggering device in the step of providing is a portable wireless transponder.¹⁰

The present invention, as now set forth in dependent Claim 3, relates to a method of Claim 2, wherein the transponder has the unique code stored therein in a non-volatile memory.¹¹

The present invention, as now set forth in dependent Claim 4, relates to a method of Claim 1, wherein the unique code in the step of providing is uniquely associated with the web page.¹²

The present invention, as now set forth in dependent Claim 5, relates to a method of Claim 1, wherein the interface system in the step of transmitting comprises a receiver operatively

² See Specification, page 45, line 24 – page 46, line 5.

³ See Specification, page 47, lines 9-16.

⁴ See Specification, page 45, line 24 – page 46, line 22.

⁵ See Specification, page 45, line 24 – page 46, line 22; and page 46, lines 20-25.

⁶ See Specification, page 47, line 9 – page 48, line 2.

⁷ See Specification, page 47, lines 16-19.

⁸ See Specification, page 47, line 19 – page 48, line 2.

⁹ See Specification, reference number 1612 on Figure 16; page 47, lines 21-24; page 48, lines 15-18; and page 49, lines 13-15.

¹⁰ See Specification, page 46, lines 2-5; and page 46, line 25 – page 47, line 8.

¹¹ See Specification, original Claim 3; reference number 3139 on Figure 31; and page 53, lines 3-7.

¹² See Specification, page 47, lines 16-20.

connected to a computer, the receiver for receiving a triggering signal having the unique code contained therein.¹³

The present invention, as now set forth in dependent Claim 6, relates to a method of Claim 1, wherein the user manually enables the triggering device to transmit the unique code in the step of triggering.¹⁴

The present invention, as now set forth in dependent Claim 7, relates to a method of Claim 1, wherein the step of retrieving location information further comprises the step of matching the unique code with the location information of the database.¹⁵

The present invention, as now set forth in dependent Claim 8, relates to a method of Claim 7, wherein the database in the step of retrieving is local to the interface system.¹⁶

The present invention, as now set forth in dependent Claim 9, relates to a method of Claim 7, wherein the database in the step of retrieving is located at an intermediary location on the network.¹⁷

The present invention, as now set forth in dependent Claim 10, relates to a method of Claim 9, wherein the step of retrieving location information from the intermediary location further comprises the step of appending to the unique code routing information which defines the location of the intermediary location on the network such that the unique code is transmitted to the intermediary location in accordance with the appended routing information.¹⁸

The present invention, as now set forth in dependent Claim 11, relates to a method of Claim 1, wherein the step of connecting is performed using a browser program.¹⁹

The present invention, as now set forth in dependent Claim 12, relates to a method of Claim 1, wherein the steps of retrieving, connecting and displaying are performed automatically in response to the step of transmitting.²⁰

¹³ See Specification, page 45, line 24 – page 46, line 5; and page 46, lines 20-25.

¹⁴ See Specification, page 46, line 13 – page 47, line 8.

¹⁵ See Specification, page 47, lines 14-17.

¹⁶ See Specification, page 48, lines 3-6.

¹⁷ See Specification, page 47, lines 9-14.

¹⁸ See Specification, page 47, lines 9-12.

¹⁹ See Specification, Figure 20; page 8, lines 8-9; and page 42, lines 26-27.

The present invention, as now set forth in dependent Claim 13, relates to a method of Claim 1, wherein the step of presenting comprises displaying the web page to the user via a display operatively connected to the interface system.²¹

The present invention, as now set forth in independent Claim 14, relates to an apparatus for displaying a web page to a user. The apparatus comprises a triggering device having a unique code associated therewith that uniquely identifies the triggering device.²² The apparatus including an interface system disposed on a network and operable to receive said unique code transmitted from said triggering device;²³ wherein said unique code is used to retrieve associated location information from a database;²⁴ said location information corresponding to a location of the web page on a remote location²⁵ disposed on said network, the unique code having no location information contained therein;²⁶ wherein said interface system connects to said remote location in response to said location information being retrieved from said database;²⁷ wherein the web page corresponding to said location information of said remote location is presented to the user via said interface system.²⁸

The present invention, as now set forth in dependent Claim 15, relates to the apparatus of Claim 14, wherein said triggering device is a portable wireless transponder.²⁹

The present invention, as now set forth in dependent Claim 16, relates to the apparatus of Claim 15, wherein said transponder has said unique code stored therein in a non-volatile memory.³⁰

²⁰ See Specification, page 47, lines 9-26.

²¹ See Specification, reference number 1612 on Figure 16; page 47, lines 21-24; page 48, lines 15-18; and page 49, lines 13-15.

²² See Specification, reference number 1500 on Figure 25; page 45, lines 24-28; page 46, lines 20-22; page 47, lines 1-6.

²³ See Specification, page 45, line 24 – page 46, line 22.

²⁴ See Specification, page 47, line 9 – page 48, line 2.

²⁵ See Specification, page 47, lines 16-19.

²⁶ See Specification, page 45, line 24 – page 46, line 15, page 47, lines 9-16.

²⁷ See Specification, page 47, line 19 – page 48, line 2.

²⁸ See Specification, reference number 1612 on Figure 16; page 47, lines 21-24; page 48, lines 15-18; and page 49, lines 13-15.

²⁹ See Specification, page 46, lines 2-5, page 46, line 25 – page 47, line 8.

³⁰ See Specification, original Claim 16; original Claim 3; reference number 3139 on Figure 31; and page 53, lines 3-7.

The present invention, as now set forth in dependent Claim 17, relates to the apparatus of Claim 14, wherein said unique code is uniquely associated with the web page.³¹

The present invention, as now set forth in dependent Claim 18, relates to the apparatus of Claim 14, wherein said interface system comprises a receiver which is operatively connected to a computer, said receiver for receiving a triggering signal having said unique code contained therein.³²

The present invention, as now set forth in dependent Claim 19, relates to the apparatus of Claim 14, wherein the user manually enables said triggering device to transmit said unique code.³³

The present invention, as now set forth in dependent Claim 20, relates to the apparatus of Claim 14, wherein said location information is retrieved by matching said unique code with said location information of said database.³⁴

The present invention, as now set forth in dependent Claim 21, relates to the apparatus of Claim 20, wherein said database is local to said interface system.³⁵

The present invention, as now set forth in dependent Claim 22, relates to the apparatus of Claim 20, wherein said database is located at an intermediary location on said network.³⁶

The present invention, as now set forth in dependent Claim 23, relates to the apparatus of Claim 22, wherein routing information is appended to said unique code, which said routing information defines the location of said intermediary location on said network such that said unique code is transmitted to said intermediary location in accordance with said appended routing information.³⁷

³¹ See Specification, page 47, lines 16-20.

³² See Specification, page 45, line 24 – page 46, line 5; page 46, lines 20-25.

³³ See Specification, page 46, line 25 – page 47, line 8.

³⁴ See Specification, page 47, lines 14-17.

³⁵ See Specification, page 48, lines 3-6.

³⁶ See Specification, page 47, lines 9-14.

³⁷ See Specification, page 47, lines 9-12.

The present invention, as now set forth in dependent Claim 24, relates to the apparatus of Claim 14, wherein a browser program connects said interface system to said remote location.³⁸

The present invention, as now set forth in dependent Claim 25, relates to the apparatus of Claim 14, wherein the web page is automatically displayed to the user in response to said user enabling transmission of said unique code from said triggering device to said interface system.³⁹

The present invention, as now set forth in dependent Claim 26, relates to the apparatus of Claim 14, wherein the web page is presented to the user via a video display operatively connected to said interface system.⁴⁰

The present invention, as now set forth in independent Claim 27, relates to a method of displaying a web page to a user. The method comprises the step of receiving at an interface system from a triggering device a unique code when the triggering device is in physical proximity thereto,⁴¹ the unique code associated with the triggering device uniquely identifying the triggering device,⁴² the unique code associated with a remote location on a network that comprises the source of the web page,⁴³ and the unique code having no location information contained therein;⁴⁴ and where the interface system is disposed on the network at a triggering location.⁴⁵ The method further includes retrieving location information associated with the unique code from a database,⁴⁶ the location information corresponding to the location of the web page at the remote location on the network.⁴⁷ The method further includes, in response to retrieving the location information, connecting the interface system to the remote location.⁴⁸ The

³⁸ See Specification, Figure 20; page 8, lines 8-9; and page 42, lines 26-27.

³⁹ See Specification, page 46, line 13 – page 48, line 2.

⁴⁰ See Specification, reference number 1612 on Figure 16; page 47, lines 21-24; page 48, lines 15-18; and page 49, lines 13-15.

⁴¹ See Specification, reference number 1500 on Figure 25; page 45, line 25 – page 46, line 5; page 46, lines 20-22; and page 47, lines 1-6.

⁴² See Specification, page 45, line 24 – page 46, line 22; and page 47, lines 1-8.

⁴³ See Specification, page 45, line 24 – page 46, line 5.

⁴⁴ See Specification, page 47, line 9-16.

⁴⁵ See Specification, Figures 25 & 26; page 45, line 24 – page 46, line 22; and page 46, lines 20-25.

⁴⁶ See Specification, page 47, line 9 – page 48, line 2.

⁴⁷ See Specification, page 47, lines 16-19.

⁴⁸ See Specification, page 47, lines 19 – page 48, line 2.

method further includes presenting the web page corresponding to the location information of the remote location to the user via the interface system.⁴⁹

The present invention, as now set forth in dependent Claim 28, relates to a method of Claim 27, wherein the triggering device in the step of receiving is a portable wireless transponder.⁵⁰

The present invention, as now set forth in dependent Claim 29, relates to a method of Claim 28, wherein the transponder has the unique code stored therein in a non-volatile memory.⁵¹

The present invention, as now set forth in dependent Claim 30, relates to a method of Claim 27, wherein the unique code in the step of receiving is uniquely associated with the web page.⁵²

The present invention, as now set forth in dependent Claim 31, relates to a method of Claim 27, wherein the interface system in the step of receiving comprises a receiver operatively connected to a computer, the receiver for receiving a triggering signal from the triggering device having the unique code contained therein.⁵³

The present invention, as now set forth in dependent Claim 32, relates to a method of Claim 27, wherein the step of retrieving location information further comprises the step of matching the unique code with the location information of the database.⁵⁴

The present invention, as now set forth in dependent Claim 33, relates to a method of Claim 32, wherein the database in the step of retrieving is local to the interface system.⁵⁵

⁴⁹ See Specification, reference number 1612 on Figure 16; page 47, lines 21-24; page 48, lines 15-18; and page 49, lines 13-15.

⁵⁰ See Specification, page 46, lines 2-5; and page 46, line 25 – page 47, line 8.

⁵¹ See Specification, original Claim 3; reference number 3139 on Figure 31; and page 53, lines 3-7.

⁵² See Specification, page 47, lines 16-20.

⁵³ See Specification, page 45, line 24 – page 46, line 5; page 46, lines 20-25.

⁵⁴ See Specification, page 47, lines 14-17.

⁵⁵ See Specification, page 48, lines 3-6.

The present invention, as now set forth in dependent Claim 34, relates to a method of Claim 32, wherein the database in the step of retrieving is located at an intermediary location on the network.⁵⁶

The present invention, as now set forth in dependent Claim 35, relates to a method of Claim 34, wherein the step of retrieving location information from the intermediary location further comprises the step of appending to the unique code routing information which defines the location of the intermediary location on the network such that the unique code is transmitted to the intermediary location in accordance with the appended routing information.⁵⁷

The present invention, as now set forth in dependent Claim 36, relates to a method of Claim 27, wherein the steps of retrieving, connecting and displaying are performed automatically in response to the step of receiving.⁵⁸

The present invention, as now set forth in dependent Claim 37, relates to a method of Claim 27, wherein the step of presenting comprises displaying the web page to the user via a display operatively connected to the interface system.⁵⁹

VI. Grounds of Rejection to be Reviewed on Appeal.

Claims 1-37 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,446,871 to Buckley et al. ("*Buckley*") in view of U.S. Patent 5,903,225 to Schmitt et al. ("*Schmitt*").

As detailed below, Appellants believe that the Examiner has improperly applied the combination of the *Buckley* and *Schmitt* references to claims 1-37. Specifically, Appellants submit that the §103 rejections based on the combination of *Buckley* and *Schmitt* are not proper and are without basis, and that the Examiner has failed to state a *prima facie* case as to the combination of *Buckley* and *Schmitt* constituting a viable combination of references under 35 U.S.C. § 103.

⁵⁶ See Specification, page 47, lines 9-14.

⁵⁷ See Specification, page 47, lines 9-12.

⁵⁸ See Specification, page 47, lines 9-26.

⁵⁹ See Specification, reference number 1612 on Figure 16; page 47, lines 21-24; page 48, lines 15-18; and page 49, lines 13-15.

VII. Argument and Discussion.

In order to prevail, Appellants must show that Examiner has improperly combined *Buckley* and *Schmitt* in support of the 35 U.S.C. § 103. As such, a brief discussion of the relevant rules and recent court decisions affecting a proper rejection under 35 U.S.C. § 103 follows.

A. Rejections under 35 U.S.C. §103

MPEP § 2142 specifies that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

In regard to what an examiner must show in order to establish a *prima facie* case of obviousness, MPEP § 2142 further explains that:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. . . . Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

In regard to what an examiner must do in order to meet the first criterion for a *prima facie* rejection, MPEP § 2143.01 specifies that:

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art.

In the present application, the various combinations of references proposed by the Examiner are not supported by a proper suggestion or motivation to make each proposed modification. This means that the first criterion for a *prima facie* rejection has not been met, which in turn means the Examiner has failed to carry the burden of establishing a *prima facie*

rejection. In addition, certain claim limitations are not taught or suggested by the cited combinations, which means that the third criterion for a *prima facie* rejection has not been met, and that the Examiner has further failed to carry the burden of establishing a *prima facie* rejection for this independent reason. Further, the Examiner has failed to put forth any arguments and has not provided any articulated reasoning as to how any deficiency (missing element) could be solved in a predictable manner through combination with any other reference.

B. Recent Decisions Affecting a Finding of Obviousness.

1. In re Kahn.

With respect to obviousness, a claimed invention is unpatentable if the differences between it and the prior art are “such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art.”⁶⁰ Obviousness is a question of law, based upon underlying factual questions which are reviewed for clear error following a bench trial. These “underlying factual inquiries include: (1) The scope and content of the prior art; (2) The level of ordinary skill in the prior art; (3) The difference between the claimed invention and the prior art; and (4) Objective evidence of nonobviousness.”⁶¹

In *Kahn* the Court noted that:

“...to reject claims in an Application under § 103, an Examiner must show and un rebutted *prima facie* case of obviousness . . . on appeal to the board, an Applicant can overcome a rejection by showing insufficient evidence of a *prima facie* obviousness or by rebutting the *prima facie* case with evidence of secondary indicia of nonobviousness.”⁶²

When combining references, it is well recognized that “[m]ost inventions arise from a combination of old elements and each element may often be found in the prior art.”⁶³ “However,

⁶⁰ 35 U.S.C. § 103(a) (2000); *In re Kahn*, 441 F.3d 977, 985 (Fed. Cir. 2006) (citing *Graham v. John Deere Co.*, 383 U.S.1, 13-14, 86 S.Ct. 684, 15L, Ed. 2d 545, 1962)

⁶¹ *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999).

⁶² *Kahn*, 441 F.3d at 985

⁶³ *In re Rouffett*, 149 F.3d 1350, 1357

mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole.”⁶⁴ *Kahn* further states:

Rather, to establish a *prima facie* case of obviousness based on a combination of elements disclosed in the prior art, the Board must articulate the basis on which it concludes that it would have been obvious to make the claimed invention. *Id.* In practice, this requires that the Board “explain the reasons one of the ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious.” *Id.* at 1357-59. This entails consideration of both the “scope and content of the prior art” and the “level of ordinary skill in the pertinent art” aspects of the Graham test.⁶⁵

The primary test that has been put forth by the Federal Circuit is the teaching-suggestion-motivation test. *Kahn* set forth that, when there is no explanation provided by the Board to explain the motivation, or the suggestion or the teaching, that would have led a skilled artisan at the time of the invention to the claimed combination as a whole, then the court would infer that hindsight was utilized to conclude that the invention was obvious. *Kahn* relied upon the *Rouffett* case for this teaching at 1358. The “teaching-suggestion-motivation” requirement was set forth to protect against the entry of hindsight into the obviousness analysis, a problem which §103 was meant to confront. Thus, in order to establish a *prima facie* case, some explanation as to teaching, suggestion, or motivation of each of the references and how they can be combined is required.

Although *Kahn* sets forth the teaching-suggestion-motivation test, there is still the “analogous-art” test that must be applied, this being one test that was articulated by the Supreme Court as part of the *Graham* analysis.⁶⁶ “The analogous-art test requires that the Board show a reference is either in the field of the Applicant’s endeavor or is reasonably pertinent as to the problem with which the inventor was concerned in order to rely on that reference as a basis for rejection.”⁶⁷ The following was further stated by *Kahn*:

References are selected as being reasonably pertinent to the problem based on the judgment of a person having ordinary skill in

⁶⁴ *Kahn*, 441 F.3d at 986, citing *Rouffett*, 149 F.3d at 1355, 1357

⁶⁵ *Id.*

⁶⁶ See *Dann v. Johnston*, 425 U.S. at 219, 226, 96 S.Ct. 1393, 47 L.Ed 2d 692 (1976).

⁶⁷ *Kahn*, 441 F.3d at 987.

the art. *Id.* (“It is necessary to consider the reality of the circumstances, in other words, common sense--in deciding in which fields a person of ordinary skill would reasonably be expected to look for a solution to the problem facing the inventor.” (quoting *In re Wood*, 599 F.2d 1032, 1036 (C.C.P.A. 1979))). We have explained that this test begins the inquiry into whether a skilled artisan would have been motivated to combine references by defining the prior art relevant for the obviousness determination, and that it is meant to defend against hindsight. See *id.*; *In re Clay*, 996 F.2d 656, 659-60 (Fed. Cir. 1992).⁶⁸

As such, the first step of analyzing the combination provided by the Examiner is to examine the references and determine if the combination satisfies the analogous-art test. The next step for determining obviousness is to analyze the teaching-suggestion-motivation test which:

... picks up where the analogous art test leaves off and informs the Graham analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, [**23] or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law, see § 103(a); *Graham*, 383 U.S. at 35; *Dann*, 425 U.S. at 227-29, and helps ensure predictable patentability determinations.⁶⁹

Even if all of the elements of a claim are disclosed in various prior art references, the long-standing rule that a claimed invention, as a whole⁷⁰, cannot be said to be obvious unless there is some reason or motivation given in prior art why someone would have been prompted to combine the teachings or the references.⁷¹ The prior art itself may suggest desirability of a combination, or the motivation may come from other sources (for example, economic factors).⁷² Thus, the motivation to combine the relevant art or teachings does not have to be found explicitly in the prior art but, rather, can be implicit thereto. “However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated

⁶⁸ *Kahn*, 441 F.3d at 987.

⁶⁹ *Id.*

⁷⁰ *In re Hiraro*, 535 F.2d, 67, (C.C.P.A. 1966).

⁷¹ *In re Regel*, 526 F.2d, 1399 (C.C.P.A. 1975); *In re Bond*, 910 F.2d, 831, (Fed. Cir. 1990).

⁷² See e.g. *In re Clinton*, 527 F.2d 1226 (C.C.P.A. 1976); *Cable Elec. Prods., Inc. v. Genmart, Inc.*, 77 F.2d, 1015 (Fed. Cir. 1985).

reasoning with some rational underpinning to support the legal conclusion of obviousness.”⁷³ The purpose of such requirement is to ensure “due process and non-arbitrary decision making”, as it is in § 103.⁷⁵

Kahn articulated the considerations for motivation when analyzing obviousness. The Court stated “the problem examined is not the specific problem solved by the invention, but the general problem that confronted the inventor before the invention was made.”⁷⁶ In the reference in *Cross*, the quote that was cited by the Court⁷⁷ was that “one of ordinary skill in the art need not see the identical problem addressed in the prior art reference to be motivated to apply its teachings.” As to motivation, the Courts upheld that the evidence of motivation to combine the prior art references “may flow from the prior art references themselves, knowledge of one of ordinary skill in the art, or, in some cases, from the nature of the problem to be solved.”⁷⁸ *Kahn* summarized the motivation-suggestion-teaching test as follows:

Therefore, the “motivation-suggestion-teaching” test asks not merely what the references disclose, but whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, would have been led to make the combination recited in the claims. See *Cross Med. Prods.*, 424 F.3d at 1321-24. From this it may be determined whether [**26] the overall disclosures, teachings, and suggestions of the prior art, and the level of skill in the art—i.e., the understandings and the knowledge of persons having ordinary skill in the art at the time of the invention—support the legal conclusions of obviousness. See *Princeton Biochemicals*, 411 F.3d at 1338 (pointing to evidence supplying detailed analysis of the prior art and the reasons one of ordinary skill would have possessed the knowledge and motivation to combine).⁷⁹

⁷³ *Kahn*, 441 F.3d at 998 referring to *Lee*, 277, F.3d at 1343-46 and *Rouffett*, 149 F.3d at 1355-59.

⁷⁴ It is noted that the Supreme Court in the recently decided case, *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727 (2007) cited this specific language at page 1741 therein.

⁷⁵ *Kahn*, 441 F.3d at 998 referring to *Lee*, 277, F.3d at 1343-46 and *Rouffett*, 149 F.3d at 1355-59.

⁷⁶ *Id.* at 988, referring to *Cross Medical Products, Inc. v. Metronics Sofamore Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005).

⁷⁷ *Cross*, 424 F.3d at 1323.

⁷⁸ *Medichem S.A. v. Rolabo, S.L.*, 437 F.3d 1157, 1165 (Fed. Cir 2006), quoting *Brown and Williamson Tobacco Corp. v. Phillip Morris, Inc.*, 229 F.3d, 1120, 1125 (Fed. Cir. 2000).

⁷⁹ *Kahn*, 441 F.3d at 988.

In *Alza Corporation v. Mylan Laboratories, Inc.*, 464 F.3d 1286 (Fed. Cir. 2006), the Federal Circuit has responded to arguments made during pendency of the recently decided Supreme Court case, *KSR International Co v. Teleflex Inc, et al.*, 127 S. Ct. 1727 (2007) and has spelled out its law on obviousness, insisting that it is in harmony with Supreme Court precedent.

In the facts of this case, *Alza* sued Mylan for infringement of its patent (6,124,355) under 35 U.S.C. §271(e)(2) after Mylan sought FDA approval to market a generic version of oxybutynin, a drug used to treat urinary incontinence. The Federal Circuit affirmed the obviousness and non-infringement decisions of the district court.

In the process, Judge Arthur Gajarsa dedicated five pages of his opinion to then outline the Federal Circuit's law on obviousness, responding to many arguments made in the then pending Supreme Court case of *KSR Int'l Co. v. Teleflex, Inc.* (U.S. No. 04-1350). KSR and many amici, including the U.S. government, have challenged the Federal Circuit rule that proof of obviousness must include a showing of a "teaching, suggestion, or motivation" to combine the prior art elements of the claimed invention. KSR and others have said that this requirement is too rigid and is inconsistent with Supreme Court decisions issued since *Graham v. John Deere Co.*, 383 U.S. 1 (1966).

Judge Gajarsa wrote the following in his *Alza* opinion:

This requirement has been developed consistent with the Supreme Court's obviousness jurisprudence as expressed in *Graham* and the text of the obviousness statute that directs us to conduct the obviousness inquiry "at the time the invention was made" 35 U.S.C. §103. As we explained in [*In re Kahn*, 441 F.3d 977 (Fed. Cir. 2006)],

The motivation-suggestion-teaching test picks up where the analogous art test leaves off and informs the *Graham* analysis. To reach a non-hindsight driven conclusion as to whether a person having ordinary skill in the art at the time of the invention would have viewed the subject matter as a whole to have been obvious in view of multiple references, the Board must provide some rationale, articulation, or reasoned basis to explain why the conclusion of obviousness is correct. The requirement of such an explanation is consistent with governing obviousness law . . .

441 F.3d at 987. We further explained that the “motivation to combine” requirement “[e]ntails consideration of both the ‘scope and content of the prior art’ and ‘level of ordinary skill in the pertinent art’ aspects of the *Graham* test.” *Id.* at 986.

At its core, our anti-hindsight jurisprudence is a test that rests on the unremarkable premise that legal determinations of obviousness, as with such determinations generally, should be based on evidence rather than on mere speculation or conjecture. Our court’s analysis in *Kahn* bears repeating:

A suggestion, teaching, or motivation to combine the relevant prior art teachings *does not have to be found explicitly in the prior art*, as “the teaching, motivation, or suggestion may be implicit from the prior art as a whole, rather than expressly stated in the references.... The test for an implicit showing is what the combined teachings, knowledge of one of ordinary skill in the art, and the nature of the problem to be solved as a whole would have suggested to those of ordinary skill in the art.” However, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be *some* articulated reasoning with *some* rational underpinning to support the legal conclusion of obviousness. This requirement is as much rooted in the Administrative Procedure Act [for our review of Board determinations], which ensures due process and non-arbitrary decision making, as it is in § 103.

441 F.3d at 987-88 (quoting *In re Kotzab*, 217 F.3d 1365, 1370 (Fed. Cir. 2000)) (citations omitted) (emphases added). There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine before concluding that one of ordinary skill in the art would know to combine references. This approach, moreover, does not exist merely in theory but in practice, as well. Our recent decisions in *Kahn* and in [*Cross Med. Prods., Inc., v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293 (Fed. Cir. 2005)] amply illustrate the current state of this court’s views.⁸⁰

2. KSR

The recently issued Supreme Court Case in *KSR* held that the Federal Circuit’s Teaching, Suggestion or Motivation (TSM) test to combine known elements in order to show that the combination is obvious is too rigid. The Court reinforced their position that analysis under *Graham* has been reaffirmed. The Court indicated that its holding was that a “patent for a combination which only unites old elements with no change in their respective functions . . .

⁸⁰ *Alza Corporation v. Mylan Laboratories, Inc.*, 464 F.3d 1286, 1290 (Fed. Cir. 2006).

obviously withdraws what is already known into the field of its monopoly and diminishes the resources available to skillful men.”⁸¹ The Court stated that this was a “principal reason for declining to allow patents for what is obvious. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”⁸² The Court further went on to indicate that there were three cases that illustrated the application of this doctrine of predictability. The first case was *United States v. Adams*, 383 U.S. 39, 40 (1966). In discussing this case, the Court noted that it had “relied upon the corollary principal that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be non-obvious.”⁸³ In the second case, *Anderson’s-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57 (1969), the Court reiterated “while the combination of old elements performed a useful function, it added nothing to the nature and quality of the radiant-heat burner already patented.”⁸⁴ In the third case, *Sakraida v. AGPro, Inc.*, 425 U.S. 273 (1976), the Court stated that “when a patent ‘simply arranges old elements with each performing the same function it had been known to perform’ and yields no more than one would expect from such an arrangement, the combination is obvious.”⁸⁵

The Court summarized these three cases as follows:

The principles underlying these cases are instructive when the question is whether a patent claiming the combination of elements of prior art is obvious. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. *If a person of ordinary skill can implement a predictable variation, §103 likely bars its patentability.* For the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson’s-Black Rock* are illustrative—a court must ask whether the improvement is more than the predictable use of prior

⁸¹*KSR*, 127 S. Ct. 1727, 1739 (2007), Citing *Great Atlantic & Pacific Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152 (1950).

⁸² *Id.*

⁸³ *Id.* at page 1740.

⁸⁴ *Id.*

⁸⁵ *Id.* Citing *Sakraida* at 282.

art elements according to their established functions.⁸⁶ (Emphasis added.)⁸⁷

The Court recognized that following the above stated principals might involve more than “the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement.”⁸⁸ The Court noted that it might “be necessary for a Court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent that issued.”⁸⁹ However, the Court also noted that the analysis should be “made explicit” citing *Kahn* wherein it stated that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead there must be some articulated reason with some rational underpinning to support the legal conclusion of obviousness.”⁹⁰ The Court noted that, however, “the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.”⁹¹

Although the Court in this opinion rejected the rigidity of the TSM test, there was some reference to the decision in *Alza* wherein the Court noted the Federal Circuit’s position that “there is flexibility in our obviousness jurisprudence because the motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine . . . ,” citing *Alza*, 464 F.3d at 1291.⁹² However, the Court also noted that the *Alza* decision was not before it and that, although they may describe an analysis more consistent with the Court’s earlier precedence, the Court of Appeals would have to consider the current decision in view of its future cases.

⁸⁶ *KSR*, 127 S. Ct. at page 1740.

⁸⁷ *Id.*

⁸⁸ *Id.*

⁸⁹ *Id.* at page 1741.

⁹⁰ *Id.*

⁹¹ *KSR*, 127 S. Ct. at page 1741.

⁹² *Id.* at page 1743.

C. 35 U.S.C § 103 Rejection in the Application on Appeal.

The Examiner stated in the Final Office Action dated August 24, 2006:

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate Schmitt's teaching into Berkley's (*sic*) method to include a portable triggering device of a user having a unique code associated therewith in order to eliminate the cumbersome scanner because the triggering device would communicate with the interface system. In addition, the portable triggering device would prevent the users through the inconvenience of locating and manipulating the reader or scanner system (Schmitt, col. 2, lines 61 through col. 3, lines 3; and col. 12, lines 4-55).⁹³

Appellants submit that the Examiner simply has broken Appellants' invention into its component parts and then attempted to find a prior art reference corresponding to each component to support an obviousness rejection under 35 U.S.C. § 103. In order to establish a *prima facie* case of obviousness using the combination of *Buckley* and *Schmitt*, the Examiner must first show that each of the references is analogous prior art and then provide an explanation as to whether the overall disclosures of the references, the teachings therein and the suggestions associated therewith, in addition to the level of skill in the art, support a conclusion of obviousness as it relates to the entire invention. Further, the Examiner must show that the variation provided by Schmitt, i.e., replacing the scanner with the teachings of Schmitt, is a predictable variation. Appellants submit that the Examiner's combination of *Buckley* and *Schmitt* is conclusory, and that no articulated reasoning with some rational underpinning to support the combination has been provided. Further, Appellants submit that support for the combination is based on hindsight and that the combination is improper.

1. Independent Claim 1 as rejected by the combination of *Buckley* and *Schmitt*.

In the Final Office Action mailed August 24, 2006, the Examiner maintains his 35 U.S.C. § 103 rejection of Claims 1-37. On page 3, paragraph 4 of the Final Office Action, the Examiner states:

⁹³ See Final Office action mailed August 24, 2006, page 4.

“Buckley reference disclose (*sic*) providing a triggering device (Figure 5, scanning implement (16)) having a unique code (Fig. 5, scan code (102)) associated therewith, the unique code associated with a remote location (Fig 5, portal server (208)) on a network (Fig. 5, internet (106)) of the source of the web page (Fig. 5, content provider (214, or 216)); . . .”⁹⁴(*sic*)

In the same paragraph, the Examiner further states “however, Buckley reference fail to teach the triggering device having a unique code that uniquely identifies the triggering device and the unique code having no location information therein.”⁹⁵ (*sic*) The Examiner offers to combine *Buckley* with the *Schmitt* reference to “[teach] the triggering device having a unique code that uniquely identifies the triggering device and the unique code having no location information therein (Abstract; Figure 14; col. 2 lines 51-60; col. 3 lines 7-18, lines 53-57; col. 12 lines 34-46).”⁹⁶ The Examiner concludes that “It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate Schmitt’s teaching into Berkley’s method to include a portable triggering device of a user having a unique code associated therewith in order to eliminate the cumbersome scanner because the triggering device would communicate with the interface system.”⁹⁷ (*sic*)

2. The Cited References – Analogous-Art Test.

The Examiner provided *Schmitt* to cure the deficiencies in *Buckley* regarding a triggering device having a unique code that uniquely identifies the triggering device, namely for the disclosure of a triggering device storing “authorization data for an authorized person.”⁹⁸ Thus, the question that must be answered in the instant application is whether the combination of *Buckley* and *Schmitt* constitute analogous-art.

a. Discussion of U.S. Patent No. 6,446,871 to *Buckley et al.*

The primary reference cited by the Examiner is *Buckley*. The primary purpose of *Buckley* is to provide a method and apparatus for storing scanned reference codes in a writing instrument to facilitate ordering products through a network.⁹⁹ A writing instrument, e.g., a pen, with a data

⁹⁴ See Final Office action mailed August 24, 2006, page 3 paragraph 4.

⁹⁵ See Final Office action mailed August 24, 2006, page 3.

⁹⁶ See Final Office action mailed August 24, 2006, page 4.

⁹⁷ See Final Office action mailed August 24, 2006, page 4.

⁹⁸ See *Schmitt* Col. 2, lines 51-55.

⁹⁹ See *Buckley* Col. 5, lines 62-67; Col. 6, lines 1-3.

transfer segment, is provided. The data transfer segment is capable of scanning a code and transferring the scanned information into a data well.¹⁰⁰ Essentially, *Buckley* provides a means for a user to scan a reference code, such as found on a product, a catalogue, or a periodical with an electronic pen.¹⁰¹ When the user scans the reference code, the information is stored within the electronic pen. The user may subsequently transmit the stored reference code to a data well for further transmission to a client personal computer (PC) and, ultimately, from the PC to a network. The data transfer segment of the electronic pen includes a scan tip that is moved across a bar code to read the bar code. The data transfer segment of the electronic pen also includes a data transfer assembly to transfer signals representing the scanned codes through a data well in connection to a client PC.¹⁰² The client PC uses the received signals to access a database and connect to a web-site.¹⁰³ There is no disclosure that the scanned code is in any way associated with the pen at any time in the entire process.

b. Discussion of U.S. Patent No. 5,903,225 to *Schmitt et al.*

The *Schmitt* reference discloses an access control system that includes a fingerprint sensor. In one embodiment, the fingerprint sensor is used in conjunction with an access triggering device. The access triggering device preferably cooperates with an enrolling station to store authorization data for an authorized person based on the sensed fingerprint.¹⁰⁴ In another embodiment, the access triggering device also includes a wireless transmitter or transponder, such as one contained in an access badge. The access badge is programmed with authorization codes after an individual's authorization data is entered into the enrolling station.¹⁰⁵ The authorization codes are stored in the data storing means of the access badge. The data storing means of the access badge also may include identity storing means for storing authorization data relating to the identity of the authorized person.¹⁰⁶ The authorized person may be unobtrusively granted access by use of the access triggering device.¹⁰⁷

¹⁰⁰ See *Buckley* Col. 5, lines 37-48.

¹⁰¹ See *Buckley* Col. 5, lines 29-48.

¹⁰² See *Buckley* Col. 6, lines 20-67, Col. 7, lines 36-43.

¹⁰³ See *Buckley* Col. 9, lines 1-7.

¹⁰⁴ See *Schmitt* Abstract; Col. 12, lines 23-30.

¹⁰⁵ See *Schmitt* Col. 12, lines 23-30.

¹⁰⁶ See *Schmitt* Abstract, Col. 13, lines 40-46.

¹⁰⁷ See *Schmitt* Col. 12, lines 47-59.

3. Conclusion – Analogous Art Test.

Buckley provides a portable device designed to scan and store a reference code of a product to transmit a signal representing the reference code to a PC. The PC, not the portable device, then sends the signal to a purchasing system or network. *Buckley* does not teach a need to associate any information to a user, nor does it teach a device requiring a unique identification. As described above, *Buckley*, although possibly analogous, is deficient in supporting the 35 U.S.C. § 103 rejection alone because it does not disclose a triggering device having a unique code that uniquely identifies the triggering device.

Schmitt discloses an access control system with a triggering device that interacts with an access controller to grant access to an *authorized individual*. *Schmitt* relies on an enrolling station to program the authorization codes into the triggering device. The authorization codes may relate to *authorization data for the authorized individual* once the individual's information has been sorted in the enrolling station. The authorization data may also be a fingerprint of the authorized individual. The Examiner is relying on *Schmitt* for the element “providing a triggering device having a unique code associated therewith that uniquely identifies the triggering device” of the Appellant's Claim 1, which the Examiner admits is missing from *Buckley*.

As Appellants stated in its Response filed May 30, 2006, “[the code] uniquely identifies the user of the transponder.”¹⁰⁸ *Schmitt* is disposed to present information that can be altered through use of a disclosed programming device, referred to by the reference number “202.” The system is designed to be utilized with a fingerprint sensor to monitor and control access of an individual. Appellants note that such systems are readily designed for changes resulting from the loss of an access badge or change in authorization level. Therefore, the information in the *Schmitt* device:

- 1) identifies an individual, not the device; thus, it may be unique to an individual but it is not unique to the device; and

¹⁰⁸ See Response dated May 30, 2006 on page 9.

- 2) can be altered as required; thus, if a card is turned in by someone who will no longer be an authorized user and the card is re-issued to a new person who has been authorized and entered into the enrolling station, new authorization data relating to the newly authorized individual would be encoded into the device.

The *Schmitt* system, as with many access control systems, is disposed to control the access of a user. It is not disposed to control information regarding the access badge.

Appellants fail to see how *Schmitt* constitutes analogous art. One skilled in the art would not look towards an access control system for the purpose of providing a triggering device with “a unique code that uniquely identifies the triggering device” and wherein the unique code would be utilized for comparison to a relational database for the purpose of accessing a particular web page, especially since the Examiner seeks to apply an *authorization code for an authorized person* from the *Schmitt* system as analogous art in this instance. Therefore, Appellants submit that the *Schmitt* reference is not an analogous reference with respect to this element.

Buckley, taken alone, is insufficient to support a finding of obviousness under 35 U.S.C. § 103. The Examiner agrees with this assertion.¹⁰⁹ Thus, the Examiner provided *Schmitt*. MPEP § 2141.01(a) states that for a prior art reference to be relied upon as basis for a 35 U.S.C. § 103 rejection, then that reference must be analogous prior art. *Schmitt* is not an analogous prior art reference. Therefore, the use of the non-analogous *Schmitt* reference to support an obviousness rejection is improper, and the Examiner has failed to establish a *prima facie* case of obviousness.

4. The Cited References – Teaching/Suggestion/Motivation Test.

Regardless of whether *Schmitt* is found to be analogous art using the analogous-art test, the next step for determining obviousness is to analyze under the teaching-suggestion-motivation test. As previously discussed, the recent *KSR* Supreme Court case indicated that the Teaching-Suggestion-Motivation (TSM) test is not a rigid test; however, it is still considered to be a factor. Under this test, each of the references must contain some type of teaching, as well as some type

¹⁰⁹ See Final Office Action mailed August 24, 2006, page 3, paragraph 4.

of suggestion, to allow for the combination. One also must be motivated to combine the references. If this test alone were utilized, the questions that must be answered are whether *Buckley* and *Schmitt* contain any teaching that would suggest to one skilled in the art to combine these two references to overcome the problem addressed by the present application, and whether any motivation to so combine exists.

a. Discussion of *Buckley* – TSM Test

Independent Claim 1 of the instant application, as currently presented, is directed, in the preamble, to a method of displaying a web page to a user. The first step is to provide a triggering device having a unique code associated therewith that uniquely identifies the triggering device, the unique code associated with a remote location on a network that comprises the source of the web page, and the unique code having no location information contained therein. Although *Buckley* provides a triggering device, Appellants and the Examiner agree that *Buckley* does not disclose the triggering device having a unique code. Furthermore, *Buckley* contains no suggestion or teaching of a triggering device with a unique code that uniquely identifies the triggering device or that such would be useful for its intended purpose.

The *Buckley* reference discloses a portable device that is used to scan a plurality of bar codes, and transmit these bar codes to a client PC. As such, the primary purpose of the *Buckley* device is to scan codes and download the scanned codes to a PC. The PC transmits the scanned code to the network. One embodiment of *Buckley* refers to an indirect method of providing a barcode to the internet connection.¹¹⁰ In a second embodiment of *Buckley*, a bar code is scanned and then the bar code is sent to application software (204). The application software then determines the mapping of the bar codes to the URLs. Once the URLs have been retrieved, they are passed to a browser (206) via a path (203). Then, the URLs are displayed to the user.¹¹¹

Thus, the Examiner is correct in that *Buckley* discloses no unique code associated with the scanner, nor does it disclose a way to utilize such a unique kind of code to connect to a remote location. Appellants previously noted that the only place any type of permanent connection is provided is in the application software (204), but this application software is not

¹¹⁰ See *Buckley* Figure 4, Col 9, lines 50-67, Col 10, lines 1-54.

¹¹¹ See *Buckley* Figure 5, Col 11, lines 13-27.

uniquely associated with the scanning device nor is it such that it has no location information associated therewith.¹¹² In fact, the application software (204) would have the URL of the portal server (208), such that no lookup would be required in a relational data base, i.e., the location information is associated with it.¹¹³ This is illustrated in the disclosure as follows:

As shown in FIG. 9, the browser then displays the information, e.g., as links. One embodiment of a system according to the invention can integrate links associated with scanned codes into a user's favorite search engine or portal.¹¹⁴

The claim requires that the triggering device have a unique code associated therewith that uniquely identifies the trigger device. *Buckley* fails in this aspect, since no unique code is associated therewith, as recognized by the Examiner

Appellants respectfully submit that since *Buckley* fails to disclose a triggering device having a unique code associated therewith that uniquely identifies the triggering device, *Buckley* further fails to disclose the additional requirement of the first step of Claim 1 where “the unique code associated with a remote location on a network that comprises the source of the web page, and the unique code having no location information contained therein.” *Buckley* discloses a device that scans a bar code and transmits that bar code to a client PC wherein the scanned code is used by the client PC to connect a remote node on the network to access content from various content providers. Therefore, *Buckley* discloses a scanned code of a separate item or product, not a code that is unique to the triggering device, which is associated with a remote location on a network.

The second step of Claim 1 requires transmitting the unique code from the triggering device to an interface system, where the interface system is disposed on the network at a triggering location. In the Final Office Action (dated August 24, 2006), the Examiner states that the “*Buckley* reference disclose (*sic*) providing a triggering device (Figure 5, scanning implement (16)) having a unique code (Fig. 5, scan code (102)) . . . transmitting the unique code from the triggering device to an interface system (Fig. 5, ASCII string (200))”¹¹⁵ (*sic*). However,

¹¹² See Response dated November 29, 2004 at page 6.

¹¹³ See Response dated November 29, 2004 at page 6.

¹¹⁴ See *Buckley* Col. 11, lines 13-17.

¹¹⁵ See Final Office action mailed August 24, 2006, page 3 paragraph 4.

Buckley discloses transmitting signals representing a scanned code, not a unique code that uniquely identifies the triggering device. This is illustrated in the *Buckley* disclosure at column 10, line 66 through column 11, line 5, describing Figure 5, ASCII string (200). The specific disclosure set forth as follows:

“In step 200, the system transmits the signals representing the *scanned code(s)* to the client personal computer (PC) 104. In one embodiment, the system can transmit the signals as an ASCII string. Furthermore, the client PC receives the signals through a port 202. The port can be any one of a variety of ports, such as a serial, infrared, or radio-frequency port.”¹¹⁶ (*emphasis added*)

In its Response, Appellants noted:

“the Examiner indicates that *Buckley* discloses transmitting the unique code from a triggering device to the interface system. All that *Buckley* transmits are bar codes which are not unique to the scanner. Thus, [Applicants believe] that the *Buckley* device fails in a key aspect of the system. This key aspect allows a manufacturer of a scanner or a portable device to provide that portable device to a user. When the portable device is proximate to or connected to or interfaced with the interface device, the unique code can be transmitted to the interface device for the purpose of connecting the interface device to a location on the web that is associated with that code. The purpose of this is to insure that the user is connected to a web site associated with the remote device that they have on their person. Since there is no way of associating a unique code with the device, nor is there any suggestion that such would be the case, there is no way to achieve the purpose that [Applicants’] device seeks to achieve; that is, to tie the location on the web uniquely to the triggering device, i.e., the device that has the identifying code associated therewith.”¹¹⁷

Claim 1 also requires retrieving location information associated with the unique code from a database, the location information corresponding to the location of the web page at the remote location on the network. The Examiner states that *Buckley* “[retrieves] location information associated with the unique code from a database, the location information corresponding to the location of the web page at the remote location on the network (Fig. 9, col.

¹¹⁶ See *Buckley*, Col 10, lines 66-67, Col 11, lines 1-5.

¹¹⁷ See Response dated September 27, 2005 pages 6 and 7.

11, lines 18-26 (map barcode with dB supported by content provider (214)).”¹¹⁸ However, as Appellants stated hereinabove, *Buckley* discloses the client PC sending signals representing the *scanned codes* to a Portal Server. URLs, associated with the *scanned codes*, are returned to the client PC.¹¹⁹

Claim 1 additionally requires, in response to retrieving the location information, connecting the interface system to the remote location; and presenting the web page corresponding to the location information of the remote location to the user via the interface system. The Examiner cited the *Buckley* disclosure at column 11, lines 6-26 for this teaching. The specific section of the disclosure sets forth:

A software application 201 on the client's PC 104 receives the signals representing the scanned code(s) and runs a browser 206. The application 201 filters the signals and/or connects via the Internet 106 and Portal Server 208 to Remote Nodes 210, 212 to determine URLs and other information associated with the scanned bar code(s). In step 203, the application 201 sends the browser 206 the associated URLs and other information. As shown in FIG. 9, *the browser then displays the information, e.g., as links*. One embodiment of a system according to the invention can integrate links associated with scanned codes into a users favorite search engine or portal.

A user provided with a *variety of links* based on previously scanned codes can then select one of the links. The browser 206, activated by the *selection of a link*, connects via the Internet 106 and the CrossLink Portal Server 208 to a content provider 214 or 216. In addition, bar code mapping software 222 can map bar codes to articles in a database 220 supported by a content map provider.¹²⁰ (*emphasis added*)

Therefore, *Buckley* is teaching that hyperlinks (e.g. links to URLs) are displayed to the user PC. The user may be provided with multiple links. The user may select, from the multiple links, the link to which they wish to connect. Therefore, the only way, in *Buckley*, to connect to a remote location and display the web page corresponding to the location information is for the

¹¹⁸ See Final Office Action dated August 24, 2006, page 3, paragraph 4.

¹¹⁹ See *Buckley*, Col 11, lines 6-26.

¹²⁰ See *Buckley* Col. 11, lines 6-26.

user to select a specific link that is provided. *Buckley* is not operable to connect to a remote location and display an associated web page *in response to retrieving location information*.

As such, the only disclosure in *Buckley* is to provide a device to read a bar code on another object and to transmit a signal representing the scanned bar code(s). There is no teaching or suggestion in *Buckley* that would provide for a triggering device having a unique code associated therewith that uniquely identifies the triggering device. A unique code, uniquely identifying the triggering device, in the *Buckley* device does not enhance or further the system for transmitting a signal representing a scanned code. Basically, *Buckley* is concerned with returning information, e.g., links, associated with a scanned article, not with information associated with the triggering device. Additionally, the information returned in Appellants' present invention is specifically in response to the unique code of the triggering device. The unique code has no relationship with a scanned code. Furthermore, the information displayed in *Buckley* is linked to locations on the network. There is no operation disclosed or suggested for connecting to locations and displaying of associated web pages in response to retrieving location information associated to the unique code. *Buckley* does not contain a motivation that would cause one to search further and look for a solution of somehow providing a triggering device having a unique code associated therewith that uniquely identifies the triggering device for the purpose of later returning information from remote location that is associated with the unique code of the triggering device. There is no reason for such in order to achieve the purpose of *Buckley* and, therefore, there is no reason for one, faced with the problems to be solved by *Buckley*, to seek a solution to provide a triggering device having a unique code associated therewith that uniquely identifies the triggering device.

The disclosure in *Buckley* does not support the Examiner's argument that a portable triggering device of a user having a unique code associated therewith would eliminate the cumbersome scanner because the triggering device would communicate with the interface system.¹²¹ Additionally, *Buckley* contains no support for providing a unique code in the portable triggering device to prevent the inconvenience of locating and manipulating the reader or scanner system.¹²² *Buckley* discloses a scanner as part of a pen. Inclusion of the scanner as part of a

¹²¹ See Final Office Action dated August 24, 2006, page 4, paragraph 4.

¹²² See Final Office Action dated August 24, 2006, page 4, paragraph 4.

writing instrument provides a convenient way to allow a reader to scan a reference code of a periodical, article or advertisement.¹²³ One skilled in the art would not look to any other reference to provide a convenient, less cumbersome scanner, as that is exactly what *Buckley* provides.

Thus, to apply *Buckley* for the purpose of obviating Claim 1 in the instant application, the Examiner must show that *Buckley* contains a teaching, suggestion, or motivation to solve the problem faced by Appellants' present claims. *Buckley* must suggest that, at the time of the invention, a problem existed that could be solved by incorporating a triggering device having a unique code associated therewith that uniquely identifies the triggering device, that could be utilized in the *Buckley*-system for the purpose of retrieving location information associated with the unique code from a database. *Buckley* does not contain any such teaching, suggestion or motivation.

b. Discussion of *Schmitt* – TSM Test.

The Examiner has provided *Schmitt* to cure the deficiencies in *Buckley*. Specifically, the Examiner has relied on *Schmitt*, “to provide a triggering device having a unique code that uniquely identifies the triggering device having no location therein (Abstract; Figure 14; col. 2 lines 51-60; col. 3, lines 7-18, lines 53-57; col. 12, lines 34-46).”¹²⁴ The Examiner further states:

“[it] would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate Schmitt's teaching into Berkley's (*sic*) method to include a portable triggering device of a user having a unique code associated therewith in order to eliminate the cumbersome scanner because the triggering device would communicate with the interface system. In addition, the portable triggering device would prevent the users through the inconvenience of locating and manipulating the reader or scanner system (Schmitt, col. 2, lines 61 through col. 3, lines 3; and col. 12, lines 4-55).”¹²⁵

In its Response, Appellants stated “[*Schmitt*] provides a passive transponder with a data store provided therein, this referred to by the reference numeral ‘227.’ This data store is an area of the transponder that is programmable, such that the transponder (207) can be inserted into a

¹²³ See *Buckley*, Col. 3, lines 10-14.

¹²⁴ See Final Office Action dated August 24, 2006, page 4, paragraph 4.

¹²⁵ See Final Office Action dated August 24, 2006, page 4, paragraph 4.

slot on a programmable device (202) . . . [col. 12, line 5] . . . The purpose for programming this is to program authorization data in the transponder.”¹²⁶ There is no code or information that uniquely identifies the transponder but, rather, any stored code identifies the user of the transponder. The specific disclosure sets forth:

A method aspect of the present invention is for access control at an access location 230. The method preferably comprises the steps of: sensing a fingerprint of a person and enrolling the person as an authorized person 225 based upon the sensed fingerprint; storing authorization data for an authorized person in an access triggering device 207 to be carried by the authorized person; transmitting an authorization signal related to the stored authorization data; and receiving the authorization signal and granting access to an authorized person bearing the access triggering device based upon the access triggering device being in proximity to the access location. 230.¹²⁷

Further, *Schmitt* teaches an access control system wherein a transponder, such as a security badge, is programmed to store information about an authorized individual. The specific disclosure sets forth as follows:

In the central portion of FIG. 14, the access location 230 is at a door 212. As mentioned briefly above, the access badge 207 preferably includes a data storing means 227, cooperating with an enrolling station 200, for storing authorization data for an authorized person. The data storing means 227 stores data *for a person* who has been enrolled into the system 195 as an authorized person. The data storing means 227 may be provide by any of a number of conventional memory or data storage devices as will be readily appreciated by those skilled in the art.¹²⁸ (*Emphasis added.*)

Clearly, *Schmitt* discloses that the data stored in the triggering device, e.g., transponder or badge, is authorization data *for an authorized person*. This data may be, for example, a scanned fingerprint or authorizing code.¹²⁹ Even the portions of *Schmitt* cited by the Examiner illustrate that this is information regarding an authorized individual. The cited sections clearly teach a wireless transponder containing authorization data for an authorized individual. These cited

¹²⁶ See Response dated May 30, 2006, page 9.

¹²⁷ See *Schmitt* Col. 13, lines 54-65.

¹²⁸ See *Schmitt* Col 12, lines 23-33.

¹²⁹ See *Schmitt* Col 12, lines 37-40.

sections further disclose that this data can be the individual's fingerprint, which is obviously unique to the individual, not the triggering device. The specific cited sections are as follows:

The access triggering device preferably comprises data storing means, cooperating with the enrolling means, for storing *authorization data for an authorized person*. The access triggering device also preferably includes wireless transmitter means for transmitting an authorization signal related to the stored authorization data. In addition, the access control means preferably includes wireless receiver means for receiving the authorization signal and granting access responsive to the wireless transmitter means being in proximity to the wireless receiver means.¹³⁰ (*emphasis added*)

In one particularly, advantageous embodiment, the wireless transmitter means comprises a passive transponder. Thus, the wireless receiver means preferably comprises transponder powering means for powering the passive transponder when positioned in proximity thereto. The transponder and powering circuit therefore may be configured so that powering and authorizing signal transmission occurs only as the *authorized person* is within a predetermined distance of the access control means at the access location. The data storing means and passive transponder may be readily miniaturized to fit on or within a car to be carried in a pocket or wallet, or carried as a badge, for example.¹³¹ (*emphasis added*)

. . . Accordingly, the method may preferably further comprise the step of powering the passive transponder when positioned within a predetermined distance of the access location.¹³²

As shown in the lower schematic block diagram portion of FIG. 14, the access badge 207 also preferably includes wireless transmitter 220 for transmitting an authorization signal related to the stored authorization data. *The stored authorization signal data may be an authorizing code, or may be data based on the sensed fingerprint, for example.* In addition, the access controller 210 preferably includes a wireless receiver 222 and its associated antenna 224 for receiving the authorization signal. The wireless receiver 222 cooperates with the illustrated processor 223 for granting access responsive to the access card 207, including the

¹³⁰ See *Schmitt* Col. 2, lines 51-60.

¹³¹ See *Schmitt* Col. 3, lines 7-18.

¹³² See *Schmitt* Col. 3, lines 51-60.

wireless transmitter 220 and its associated antenna 218, being in proximity to the wireless receiver 222.¹³³ (*emphasis added*)

Therefore, *Schmitt* fails to disclose a triggering device having a unique code associated therewith that uniquely identifies the triggering device. Furthermore, since the *Schmitt* reference discloses additional methods of interaction with the access controller, including a fingerprint sensor, it is apparent that there is no desire to include a unique code within a triggering device that uniquely identifies the triggering device. Additionally, as Appellants stated in its Response, “there is no disclosure or discussion [in *Schmitt*] wherein such a unique code, if it existed, would be utilized to access a location on a network, in that the unique code is associated with the network location.”¹³⁴ If such unique code existed, the mere existence of a unique code that is permanently embedded within a chip associated with a transponder does not necessarily indicate that such code would be the code that is utilized for comparison to a relational database for the purpose of accessing a particular web page. All that *Schmitt* discloses is that the authorization data is sent to an access station. There is no disclosure that the authorization data is sent to a remote location.

The Examiner identified a particular element in the prior art, that being the limitation of a unique code tied to the triggering device. *Kahn* stated that “a mere identification in the prior art of each element is insufficient to defeat the patentability of the combined subject matter as a whole.”¹³⁵ Rather than concentrate on this element, the Examiner is required to articulate the basis on which the Examiner concludes that it would have been obvious to make the claimed invention, i.e., why one of ordinary skill in the art would have been motivated to select the references and to combine them in order to render the claimed invention obvious. The Examiner’s indication that a unique code exists does not show the existence of such teaching. Thus, the Examiner has not met a *prima facie* case by stating, “[it] would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate *Schmitt*’s teaching into Berkley’s (*sic*) method to include a portable triggering device of a user having a unique code associated therewith in order to eliminate the cumbersome scanner because the triggering device would communicate with the interface system.”

¹³³ See *Schmitt* Col. 12, lines 34-46.

¹³⁴ See Response dated May 30, 2006 at page 9.

¹³⁵ *Kahn*, 441 F.3d at 986.

Schmitt contains no teaching, suggestion, or motivation to provide “a triggering device having a unique code associated therewith that uniquely identifies the triggering device, the unique code associated with a remote location on a network that comprises the source of the web page, and the unique code having no location information contained therein. Due to the fact that any information in the triggering device of *Schmitt* is associated to the user, reliance on this one particular aspect is insufficient to show any motivation, suggestion, or teaching that would lead one skilled in the art at the time of the invention to combine the teachings of *Schmitt* with *Buckley* to allow one with the teaching of *Buckley* in front of them to incorporate an unique code in a triggering device where the unique code uniquely identifies the triggering device.

5. Conclusion – TSM Test.

Although the recent *KSR* Supreme Court case has indicated that the teaching-suggestion-motivation (TSM) test is not a rigid test, it is still considered to be a factor. Under this test, there must be some type of teaching in each of the references for combination as well as some kind of suggestion. There also must be some motivation to combine the two references. If this test alone were utilized, the question would be whether there is any teaching in *Buckley* and *Schmitt* that would suggest to one skilled in the art to combine the two references or is there any motivation to so combine.

Buckley is a reference that provides an electronic pen that scans a product code and transmits a signal representative of the scanned code to a client PC. The client PC then transmits the scanned signal to a connected network, wherein a URL associated to the scanned code is returned to the client PC. In this particular example, there is no unique code associated with the electronic pen (triggering device). Additionally, the *Buckley* system filters the scanned signal into a static field and a dynamic field. As such, the scanned code is the only information utilized by a database on the network to retrieve location information. *Buckley* contains no suggestion or teaching that a remote location on a network that comprises a web page, would be retrieved as a result of a unique code provided in and uniquely associated with a triggering device. Furthermore, one skilled in the art would recognize that retrieval of information from a scanned code disposed on a product would be associated only with the product. This would be consistent with obtaining the price of a product or information regarding the brochure or document. Furthermore, *Buckley* discloses a device that cannot be utilized with a unique code for accessing

a web page merely by passing by a kiosk or a station, wherein it is a unique code that causes access to the web page, as opposed to data that is input thereto by the user.

Schmitt provides for an access system incorporating an access badge with programmed information regarding an authorized individual contained therein. The information provided in the access badge (triggering device) is unique to the individual, not the device. Furthermore, this information is transient. It can be changed as the access badge is assigned to another user. The triggering device of *Schmitt* transmits the information regarding the authorized individual to a local control system. There is no indication that this information is utilized beyond the granting of access at the triggering point. The claims require that the unique code uniquely identify the triggering device. Thus, *Schmitt* contains no teaching therein for the type of unique code that uniquely identifies the device.

Therefore, no reason, motivation or suggestion exists to combine *Buckley* with *Schmitt*. *Buckley* has no need to use the stored information in the system of *Schmitt*, as the *Schmitt* system provides information that is not unique to the device but unique to an authorized individual. Since the information is not unique to the device in *Schmitt*, the question is “Why would one skilled in the art want to use an access badge for the purpose of accessing information located on a network associated with the triggering device?” As such, Appellants believe that there is no motivation or suggestion that would in any way lead one skilled in the art to combine such.

Based on the TSM test, the Examiner’s position is conclusory. The Examiner states that the combination of *Buckley* and *Schmitt* would provide a triggering device with a unique code stored therein “to provide a portable triggering device of a user having a unique code associated therewith in order to eliminate the cumbersome scanner because the triggering device would communicate with the interface system.” *Buckley* already discloses a scanner that is part of pen for convenience. *Buckley* further teaches the scanner may be able to communicate directly with the user PC (interface system). Furthermore, the Examiner has provided no articulated reasoning why this electronic pen would contain a unique code in order to make the pen less cumbersome (or that the pen is even cumbersome) or such that the unique code uniquely identifies the pen to be used to retrieve location information on a network associated with a unique code. Neither

Buckley nor *Schmitt* contain a unique code that is unique to the triggering device. Therefore, neither reference associates a location on the network to the unique code of a triggering device.

6. KSR Test:

The recent *KSR* case, although not fully analyzed as to its impact on obviousness type rejections under 35 U.S.C. § 103, seems to indicate that the test is that “if a person of ordinary skill can not implement a *predictable variation*, §103 likely bars it’s patentability.” (*KSR*, 550 U.S. at page 13.) The question would be whether *Buckley* could be varied in a predictable manner under this dicta to utilize information stored on an access badge to be associated with information on a network. *Buckley* would have no benefit to have a unique code that uniquely identifies the triggering device; which unique code would be nothing more than a variable identifier of the user or information associated with the scanned item. In fact, such a unique code could be argued to frustrate the purpose of the *Buckley* device to easily collect codes. In Claim 1, the purpose of the unique code is to uniquely identify the triggering device used to scan in the product information. If an authorization code were used in the *Buckley* system, there is no indication that the code would be associated to a remote location on the network. As such, there is no predictable variation of *Buckley* that would lead one skilled in the art to utilize the *Schmitt* authorization code and then modify the purpose of the *Schmitt* code to identify the device and not the person. When work is available in one field of endeavor, i.e., utilizing a triggering device with a unique code that uniquely identifies the triggering device, to access a location associated to the unique code, there is no design incentive or other market force that would prompt a predictable variation of the *Buckley* reference to utilize a unique code that identifies a person for a purpose that is not useful or envisioned in *Buckley*. In summary, Appellants submit that the Examiner has failed to provide a *prima facie* case as to why the *Buckley* and *Schmitt* references, in combination, obviate Appellants’ present inventive concept, as defined by claims 1-37.

D. Dependent Claims 3, 16, and 29 as rejected by the combination of *Buckley* and *Schmitt*.

On page 4, paragraph 4 of the Final Office Action (dated August 24, 2006), the Examiner states “[referring] to claims 3, 16, and 29, *Buckley* reference discloses the transponder has the unique code stored therein in a non-volatile memory (col. 6, lines 14-15; and col. 6, lines 62-64).” As stated hereinabove, *Buckley* does not disclose a unique code that uniquely identifies the

triggering device, wherein the unique code is associated with a remote location on a network. Claim 3 depends from and further limits Claim 1. Claim 16 depends from and further limits Claim 14 while Claim 29 depends from and further limits Claim 27. Independent Claims 14 and 27 are discussed in more detail herein below. As such, Claims 3, 16, and 29 are allowable for at least the same reasons as the claims from which they depend.

Furthermore, *Buckley* does not disclose the storage of any code, whether it be a unique code that uniquely identifies the triggering device or a scanned code, in a non-volatile memory. *Buckley* sets forth:

FIGS. 2(A)-2(E) show one embodiment of an electronic pen 16 used to read and store the bar code 14. As noted above, the electronic pen 16 is comprised of two segments, a writing segment 18 and a data transfer segment 20. The electronic pen also includes a power source such as batteries 34.

The writing segment contains a conventional pen having a writing tip 22 from which ink is dispensed. The writing segment 18 includes a refill cartridge 58 that has an extraction groove 52 in selected proximity to the distal or writing end of the refill cartridge. A user can insert the refill cartridge 58 into an extraction tool 50 so that the extraction groove 52 on the refill cartridge 58 mates with the slot 51 of the extraction tool 50. The user can then pull on the pen away from the extraction tool 50 in the direction of the longitudinal axis of the implement 16 to remove the refill cartridge 58. Subsequently, a user can simply insert a replacement refill cartridge. As can be seen in FIG. 2(A), the writing segment 18 includes a barrel 19 and a rotating end segment 27. Rotation of the end segment 27 relative to the barrel causes an internal mechanism (not shown) to extend and retract writing tip 22.

The data transfer segment 20 includes a scan tip 24 that is moved across the bar code 14 to read the code. The scan tip 24 can include a polycarbonate window and a sapphire ball. The sapphire ball is preferably transparent. The data transfer segment also includes a data transfer assembly 64. The data transfer assembly includes an analog printed circuit board (PCB) assembly 38 and a digital PCB assembly. The data transfer assembly further includes a sensor 2 and/or transmitter 56 for detecting code 14 associated with an article 10 and transmitting a signal representing a code to an information interface.

The data transfer segment further includes a button 66, an LED 68, and a speaker 72. The button 66 allows a user to activate scanning and transmitting function of the transfer segment. The LED 68 and speaker 72 provide the user with audio and visual signals regarding the success of particular scanning or transmitting actions. One version of the electronic pen 16 is disclosed in copending application Ser. No. 08/994,684, filed Dec. 19, 1997, entitled "Data/Penwell" assigned to the same assignee as the present invention, the disclosure of which is incorporated by reference.

FIG. 3(A) shows one embodiment according to the invention in which the electronic pen 16 is disposed in a data well 26 that is coupled to a computer 28 through a serial cable 30. FIGS. 3(B)-3(E) are a series of views illustrating the electronic pen 16 being inserted into a data well 26. After one or more codes have been stored in the electronic pen, the electronic pen is placed in the data well 26. The pen transfers the codes to the data well by well-known methods. The data well 26 in turn transfers signals representing the scanned codes through the serial cable to the computer.¹³⁶

As can be seen, the *Buckley* reference discloses, in detail, the components of an electronic pen. However, *Buckley* does not disclose a memory. *Buckley* does disclose that the scanned codes are stored within the electronic pen. However, Appellants submit that it is common knowledge to one of ordinary skill in the art that in contemporary usage, memory usually refers to a form of solid state storage known as Random Access Memory (RAM) and sometimes other forms of fast but temporary storage. Non-volatile memory, or NVM, is computer memory that can retain the stored information even when not powered. Examples of non-volatile memory include read-only memory, flash memory, most types of magnetic computer storage devices (e.g. hard disks, floppy disk drives, and magnetic tape), optical disc drives, and early computer storage methods such as paper tape and punch cards. Typically, non-volatile memory is used for the task of secondary storage, or long-term persistent storage. The most widely used form of primary storage today is a volatile form of random access memory (RAM), meaning that when the computer is shut down, anything contained in RAM is lost. Furthermore, *Buckley* does not disclose that the information stored within the electronic pen is retained in the event of loss of power. Additionally there is no discussion regarding how the stored information is handled

¹³⁶ See *Buckley*, Col 6, lines 14-67.

beyond the fact that, ultimately, it is transferred to a data well. As such, *Buckley* does not teach or suggest storage of information, such as a unique code, in a non-volatile memory.

E. Dependent Claims 10, 23, and 35 as rejected by the combination of *Buckley* and *Schmitt*.

On page 5, paragraph 4 of the Final Office Action (dated August 24, 2006), the Examiner states “[referring] to claims 10, 23, and 35, *Buckley* reference disclose the step of retrieving location information from the intermediary location further comprises the step of appending to the unique code routing information which defines the location of the intermediary location on the network such that: the unique code is transmitted to the intermediary location in accordance with the appended routing information (col. 10, lines 32-39).” As stated hereinabove, *Buckley* does not disclose a unique code that uniquely identifies the triggering device, wherein said unique code is associated to a remote location on a network. As such, Claims 10, 23, and 35 are allowable for at least the same reasons as the claims from which they depend.

Additionally, *Buckley* does not disclose *appending* to the unique code routing information which defines the location of the intermediary location on the network such that the unique code is transmitted to the intermediary location in accordance with the *appended routing information*. The cited text, col. 10, lines 32-39, is copied hereinbelow; lines 8-31 are added for context:

Software on the client’s PC receives the signal representing the scanned bar code and runs a browser installed on the client PC 104. The software uses the browser and the signal representing the scanned bar code to connect over the Internet 106 to a connection server 108.

In one embodiment the bar code uses code 128. Furthermore, the bar code can support a sufficient number of characters to encode the application type (interactive print, catalog shopping, securities transaction, etc.), the associated corporation or company or other entity, and the address of the associated article.

The bar code may be divided into two fields: a static field and a dynamic field. The static field may identify the application type (e.g., interactive print) and the corporation or other entity (i.e., *The Washington Post*). The dynamic field may be used to specify a particular article in a document database. The connection server 108 acts as a proxy for the client’s PC in that it associates a static field within the bar code with a content provider, e.g., Newsweek

or the Washington Post, a catalog company, or a particular stock broker. In other words, the connection server 108 filters out the static information and directs requests to the particular news agency server 110 base on the information in the static field.

The news agency server 110 implements a common gateway interface (CGI) process to dynamically map between a filtered bar code and a corresponding Uniform Resource Locator (URL). The URL refers to specific articles in content databases 114, 116, and 118. Multiple URLs can be associated with a single bar code. The connection server 108 then relays these URLs from the News Corp Web server 110, through the Internet 106, to the client PC 104.¹³⁷ (*emphasis original*)

Thus, *Buckley* discloses a system whereby the software on the client PC uses a browser and the received signals representing the scanned codes to connect to an intermediate location. Subsequently, the intermediate location filters the scanned code and returns routing information associated with the scanned code as found in a database. There is no *appending* of routing information to a unique code. As such, *Buckley* does not teach or suggest that the code, whether unique or scanned, should be *appended* with routing information.

F. Dependent Claims 2, 4-9, and 11-13 as rejected by the combination of *Buckley* and *Schmitt*.

Claims 2, 4-9, and 11-13 depend from and further limit Claim 1. These dependent claims are allowable for at least the same reasons the claim from which they depend as discussed above.

G. Independent Claims 14 and 27 as rejected by the combination of *Buckley* and *Schmitt*.

Independent Claim 14 is directed a triggering device *having a unique code associated therewith that uniquely identifies the triggering device*. This apparatus further comprises an interface system disposed on a network and operable to receive said *unique code transmitted from said triggering device*; wherein said *unique code is used to retrieve associated location information from a database*, said location information corresponding to a location of the web page on a remote location disposed on said network *the unique code having no location information contained therein*; wherein said interface system connects to said remote location in response to said location information being retrieved from said database; wherein the web page

¹³⁷ See *Buckley*, Col. 10, lines 8-39.

corresponding to the said location information of said remote location is presented to the user via said interface system.

Independent Claim 27 is directed to a method for displaying a web page to a user comprising the steps of *receiving at an interface system from a triggering device a unique code* when the triggering device is in physical proximity thereto, *the unique code associated with the triggering device uniquely identifying the triggering device, the unique code associated with a remote location on a network* that comprises the source of the web page, and *the unique code having no location information contained therein*; the interface system disposed on the network at a triggering location; retrieving *location information associated with the unique code from a database*, the location information corresponding to the location of the web page at the remote location on the network; in response to retrieving the location information, connecting the interface system to the remote location; and presenting the web page corresponding to the location information of the remote location to the user via the interface system.

Independent Claims 14 and 27 each contain limitations directed toward “a triggering device having a unique code associated therewith that uniquely identifies the triggering device” as found in Claim 1. Also as found in Claim 1, independent Claims 14 and 27 each additionally contain limitations that the unique code has no location information therein, and that the unique code is associated with location information contained within a database. Therefore, Independent Claims 14 and 27 are each allowable for at least the same reasons as Claim 1, as discussed above.

H. Dependent Claims 15, 17-22, 24-26, 28, 30-34, and 36-37 as rejected by the combination of *Buckley* and *Schmitt*.

Claims 15, 17-22, and 24-26 depend from and further limit Claim 14, while Claims 28, 30-34, and 36-37 depend from and further limit Claim 27. These dependent claims are allowable for at least the same reasons the claims from which they depend as discussed above.

VIII. Conclusion

In Summary, Appellants submit that only one of the references cited by the Examiner satisfies the analogous art requirement. Further, these references fail to provide a suggestion, motivation, or teaching for the combination because the text fails to illustrate “why” one skilled

in the art would combine the references in the particular manner required. Instead, the Examiner simply identifies particular components for each reference, combines them in a specific manner required by Appellants' claimed invention, and then states that it would be obvious to one skilled in the art to do so. This is clearly hindsight based reasoning that contravenes the standards imposed by both the MPEP and the Federal Circuit. Appellants respectfully submit that the cited combination is improper for the reasons detailed above and requests the rejections under § 103 be withdrawn.

Respectfully submitted,

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CLAIMS APPENDIX

1. A method of displaying a web page to a user, comprising the steps of:
providing a triggering device having a unique code associated therewith that uniquely identifies the triggering device, the unique code associated with a remote location on a network that comprises the source of the web page, and the unique code having no location information contained therein;
transmitting the unique code from the triggering device to an interface system, the interface system disposed on the network at a triggering location;
retrieving location information associated with the unique code from a database, the location information corresponding to the location of the web page at the remote location on the network;
in response to retrieving the location information, connecting the interface system to the remote location; and
presenting the web page corresponding to the location information of the remote location to the user via the interface system.

2. The method of Claim 1, wherein the triggering device in the step of providing is a portable wireless transponder.

3. The method of Claim 2, wherein the transponder has the unique code stored therein in a non-volatile memory.

4. The method of Claim 1, wherein the unique code in the step of providing is uniquely associated with the web page.

5. The method of Claim 1, wherein the interface system in the step of transmitting comprises a receiver operatively connected to a computer, the receiver for receiving a triggering signal having the unique code contained therein.

6. The method of Claim 1, wherein the user manually enables the triggering device to transmit the unique code in the step of triggering.

7. The method of Claim 1, wherein the step of retrieving location information further comprises the step of matching the unique code with the location information of the database.

8. The method of Claim 7, wherein the database in the step of retrieving is local to the interface system.

9. The method of Claim 7, wherein the database in the step of retrieving is located at an intermediary location on the network.

10. The method of Claim 9, wherein the step of retrieving location information from the intermediary location further comprises the step of appending to the unique code routing information which defines the location of the intermediary location on the network such that the unique code is transmitted to the intermediary location in accordance with the appended routing information.

11. The method of Claim 1, wherein the step of connecting is performed using a browser program.

12. The method of Claim 1, wherein the steps of retrieving, connecting and displaying are performed automatically in response to the step of transmitting.

13. The method of Claim 1, wherein the step of presenting comprises displaying the web page to the user via a display operatively connected to the interface system.

14. An apparatus for displaying a web page to a user, comprising:
a triggering device having a unique code associated therewith that uniquely identifies the triggering device; and
an interface system disposed on a network and operable to receive said unique code transmitted from said triggering device;

wherein said unique code is used to retrieve associated location information from a database, said location information corresponding to a location of the web page on a remote location disposed on said network the unique code having no location information contained therein;

wherein said interface system connects to said remote location in response to said location information being retrieved from said database;

wherein the web page corresponding to the said location information of said remote location is presented to the user via said interface system.

15. The apparatus of Claim 14, wherein said triggering device is a portable wireless transponder.

16. The apparatus of Claim 15, wherein said transponder has said unique code stored therein in a non-volatile memory.

17. The apparatus of Claim 14, wherein said unique code is uniquely associated with the web page.

18. The apparatus of Claim 14, wherein said interface system comprises a receiver which is operatively connected to a computer, said receiver for receiving a triggering signal having said unique code contained therein.

19. The apparatus of Claim 14, wherein the user manually enables said triggering device to transmit said unique code.

20. The apparatus of Claim 14, wherein said location information is retrieved by matching said unique code with said location information of said database.

21. The apparatus of Claim 20, wherein said database is local to said interface system.

22. The apparatus of Claim 20, wherein said database is located at an intermediary location on said network.

23. The apparatus of Claim 22, wherein routing information is appended to said unique code, which said routing information defines the location of said intermediary location on said network such that said unique code is transmitted to said intermediary location in accordance with said appended routing information.

24. The apparatus of Claim 14, wherein a browser program connects said interface system to said remote location.

25. The apparatus of Claim 14, wherein the web page is automatically displayed to the user in response to said user enabling transmission of said unique code from said triggering device to said interface system.

26. The apparatus of Claim 14, wherein the web page is presented to the user via a video display operatively connected to said interface system.

27. A method of displaying a web page to a user, comprising the steps of:
receiving at an interface system from a triggering device a unique code when the triggering device is in physical proximity thereto, the unique code associated with the triggering device uniquely identifying the triggering device, the unique code associated with a remote location on a network that comprises the source of the web page, and the unique code having no location information contained therein;

the interface system disposed on the network at a triggering location;

retrieving location information associated with the unique code from a database, the location information corresponding to the location of the web page at the remote location on the network;

in response to retrieving the location information, connecting the interface system to the remote location; and

presenting the web page corresponding to the location information of the remote location to the user via the interface system.

28. The method of Claim 27, wherein the triggering device in the step of receiving is a portable wireless transponder.

29. The method of Claim 28, wherein the transponder has the unique code stored therein in a non-volatile memory.

30. The method of Claim 27, wherein the unique code in the step of receiving is uniquely associated with the web page.

31. The method of Claim 27, wherein the interface system in the step of receiving comprises a receiver operatively connected to a computer, the receiver for receiving a triggering signal from the triggering device having the unique code contained therein.

32. The method of Claim 27, wherein the step of retrieving location information further comprises the step of matching the unique code with the location information of the database.

33. The method of Claim 32, wherein the database in the step of retrieving is local to the interface system.

34. The method of Claim 32, wherein the database in the step of retrieving is located at an intermediary location on the network.

35. The method of Claim 34, wherein the step of retrieving location information from the intermediary location further comprises the step of appending to the unique code routing information which defines the location of the intermediary location on the network such that the unique code is transmitted to the intermediary location in accordance with the appended routing information.

36. The method of Claim 27, wherein the steps of retrieving, connecting and displaying are performed automatically in response to the step of receiving.

37. The method of Claim 27, wherein the step of presenting comprises displaying the web page to the user via a display operatively connected to the interface system.

EVIDENCE APPENDIX

A. U.S. Patent No. 6,446,871 to Buckley et al. (“Buckley”) found in paragraph 4 of the Final Office Action (dated August 24, 2006), paragraphs 7-20 of the Office Action (dated November 30, 2005), paragraphs 7-20 of Office Action (dated March 28, 2005), paragraphs 4-17 of Final Office Action (dated May 27, 2004), and paragraphs 2-15 of Office Action (dated November 12, 2003).

B. U.S. Patent No. 5,903,225 to Schmitt et al. (“Schmitt”) found in paragraph 4 of the Final Office Action (dated August 24, 2006), paragraphs 7 and 8 of the Office Action (dated November 30, 2005).

C. *KSR International Co. v. Teleflex Inc., et al.*, 127 S. Ct. 1727 (2007).



US006446871B1

(12) **United States Patent**
Buckley et al.

(10) **Patent No.:** **US 6,446,871 B1**
(45) **Date of Patent:** **Sep. 10, 2002**

(54) **METHOD AND APPARATUS FOR STORING
REFERENCE CODES IN A WRITING
INSTRUMENT AND FOR RETRIEVING
INFORMATION IDENTIFIED BY THE
REFERENCE CODES**

FOREIGN PATENT DOCUMENTS

EP	0 351 063	1/1990
GB	2 306 669	5/1997
WO	WO 98/03923	1/1998
WO	WO 98/40823	9/1998

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* cited by examiner

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Primary Examiner—Karl D. Frech

(*) Notice: Subject to any disclaimer, the term of this
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U.S.C. 154(b) by 0 days.

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(57) **ABSTRACT**

(21) Appl. No.: **09/335,119**

(22) Filed: **Jun. 17, 1999**

Related U.S. Application Data

(63) Continuation-in-part of application No. 08/994,684, filed on
Dec. 19, 1997, now Pat. No. 5,955,719.

(60) Provisional application No. 60/089,891, filed on Jun. 19,
1998.

(51) **Int. Cl.**⁷ **G06K 7/10**

(52) **U.S. Cl.** **235/472.03**; 235/472.01;
235/462.45

(58) **Field of Search** 235/472.02, 472.03,
235/472.01, 462.49, 462.43, 462.46

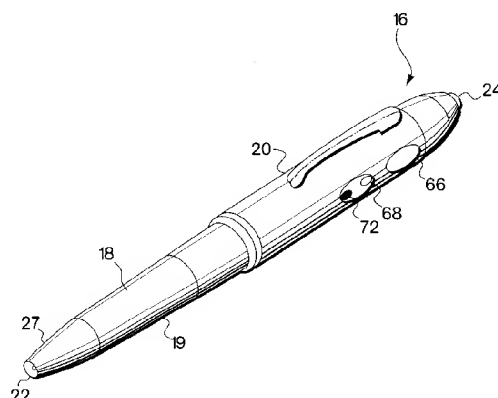
(56) **References Cited**

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3,892,974	A *	7/1975	Ellefson et al.	250/568
3,911,270	A *	10/1975	Taub	250/227
4,423,319	A	12/1983	Jacobsen	295/472
4,800,257	A *	1/1989	Johner	235/472
5,640,193	A	6/1997	Wellner	348/7
5,955,719	A *	9/1999	Southworth et al.	235/454
6,119,944	A *	9/2000	Mulla et al.	235/472.03

An interactive data transfer system and method is provided. In embodiments of the invention, the data transfer system includes a computing device, and a data well for interfacing with an elongate instrument, the elongate instrument having a data transfer end with a data transfer tip. The data well has a housing with an opening for receiving the data transfer tip of the elongate instrument. The data well also has a communications port operatively coupled to the computing device to provide data to the computing device, and the data well has a data communication device contained in the housing for interfacing with the data transfer tip when the data transfer end of the elongate instrument is received in the opening. The computing device is programmed to receive data from the data well. The received data includes data indicative of at least one address on a global communications network. The computer device is also programmed, upon receipt of the at least one address, to launch an application to retrieve information related to the at least one address from the global communications network and transmit such information to the computing device.

31 Claims, 15 Drawing Sheets



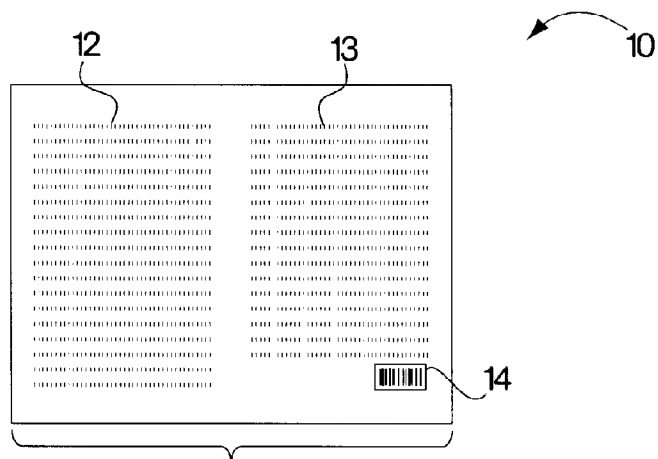


Fig. 1

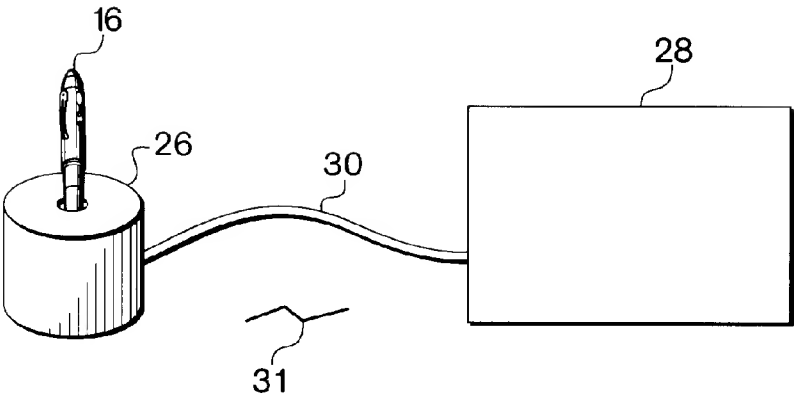
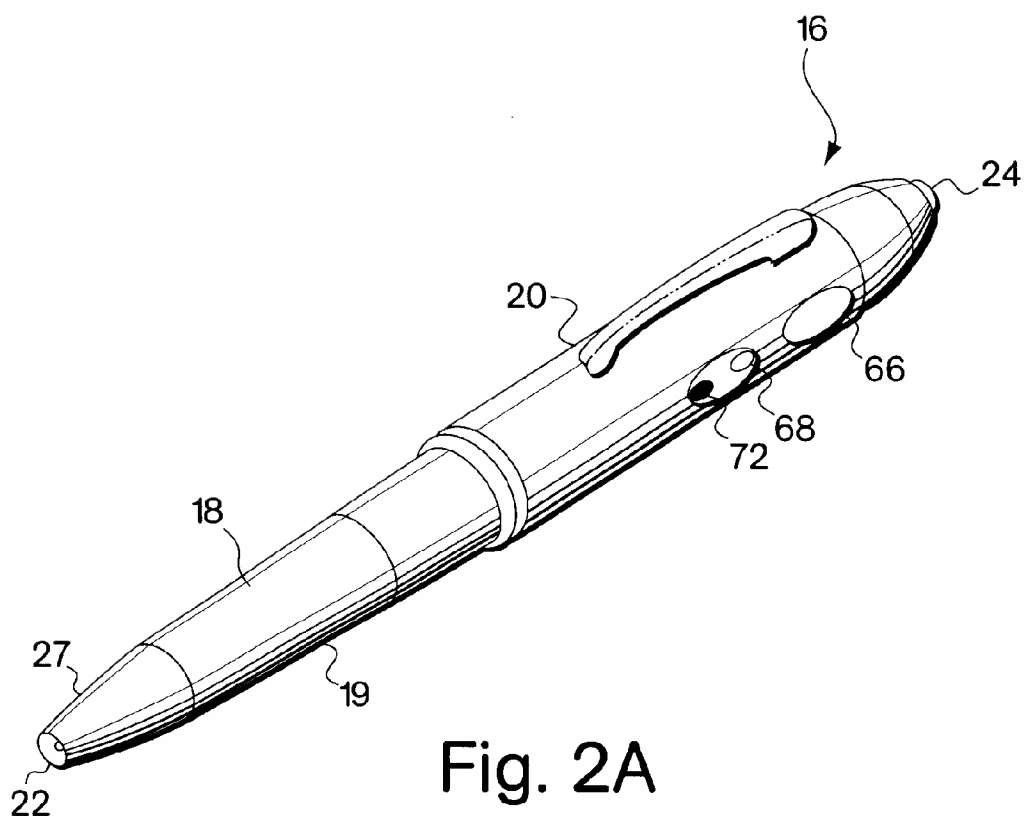


Fig. 3A



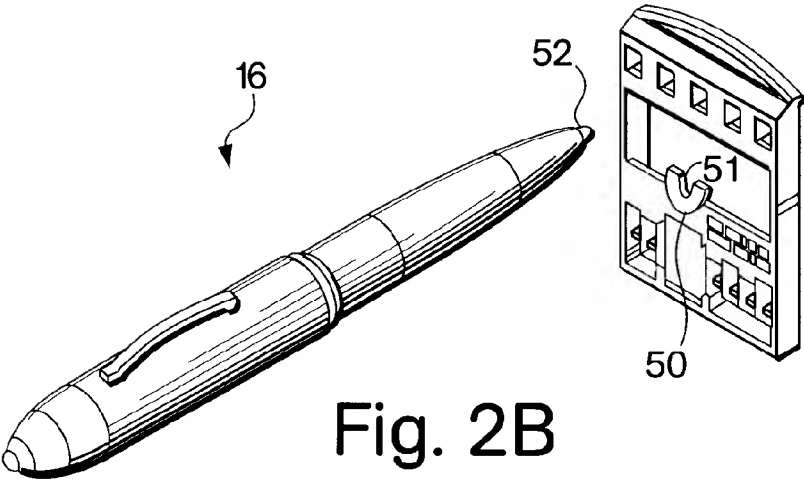


Fig. 2B

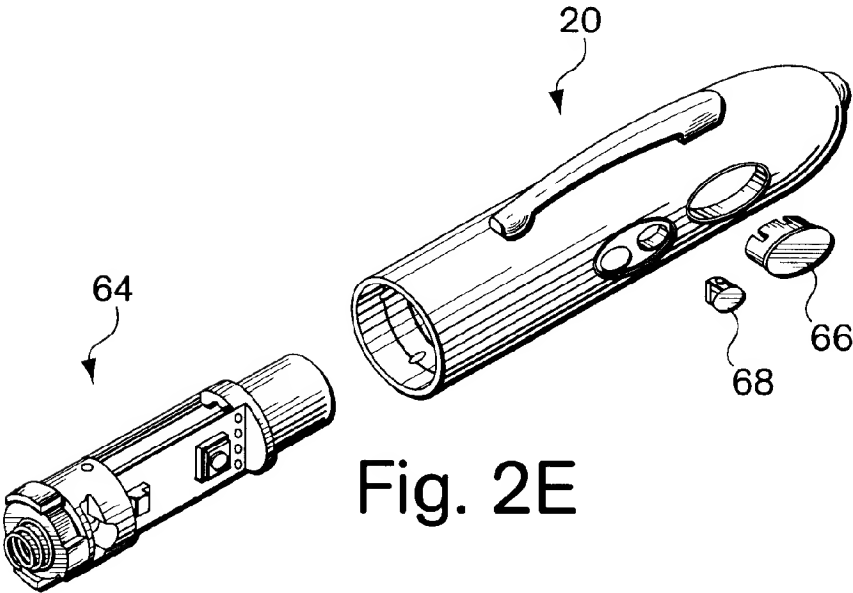


Fig. 2E

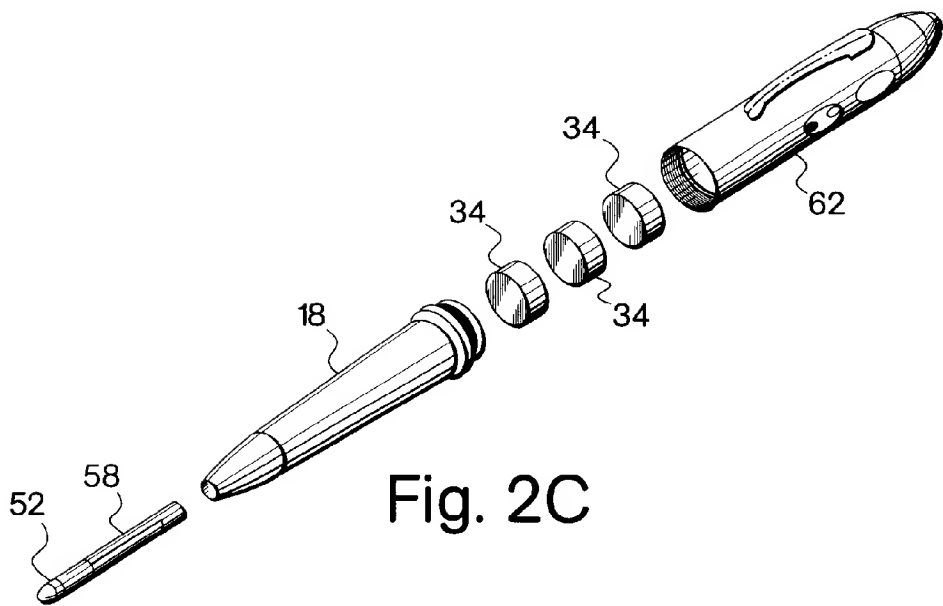


Fig. 2C

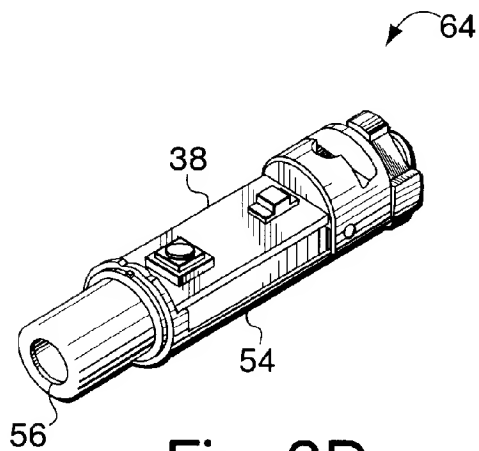


Fig. 2D

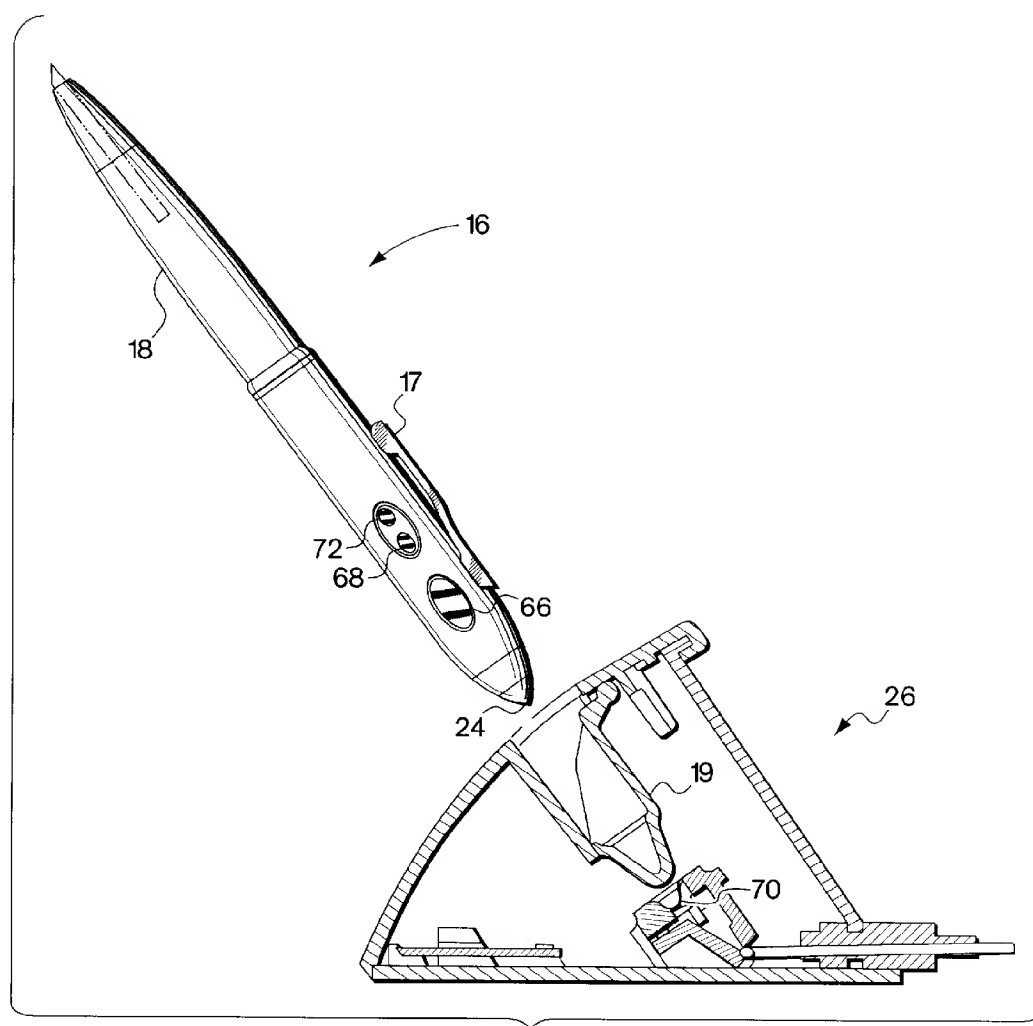


Fig. 3B

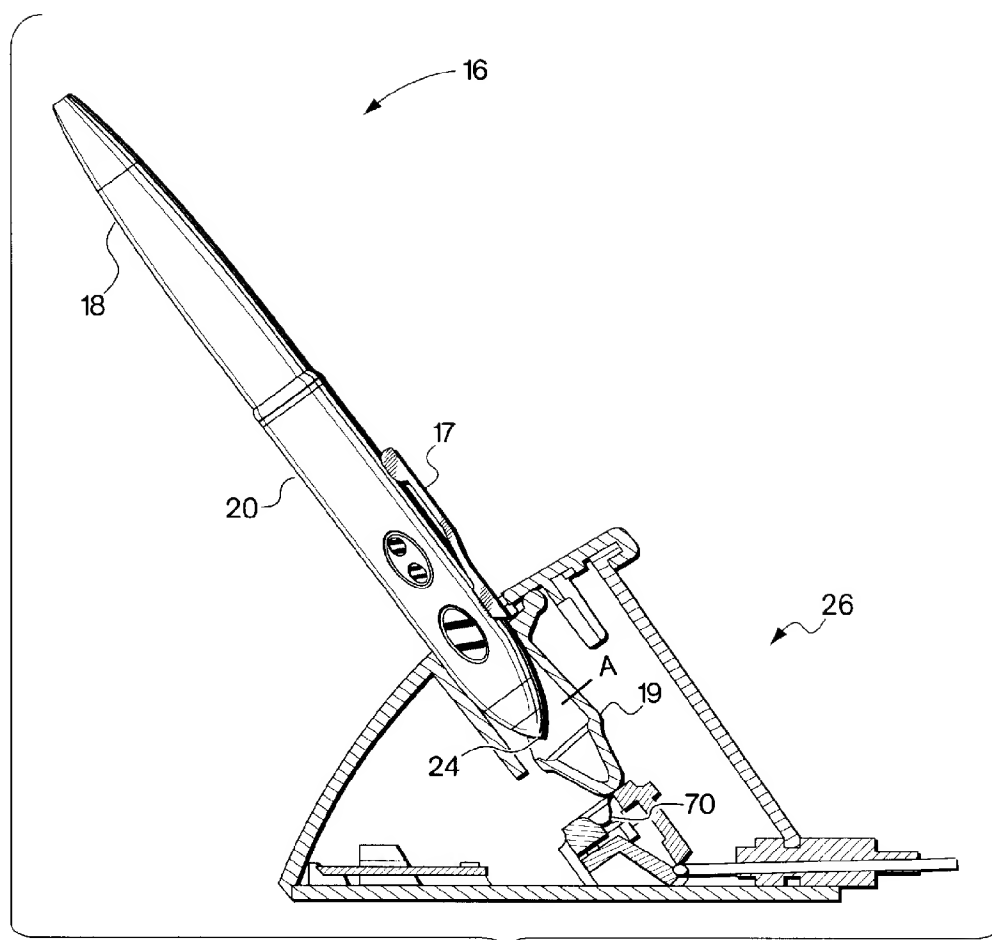


Fig. 3C

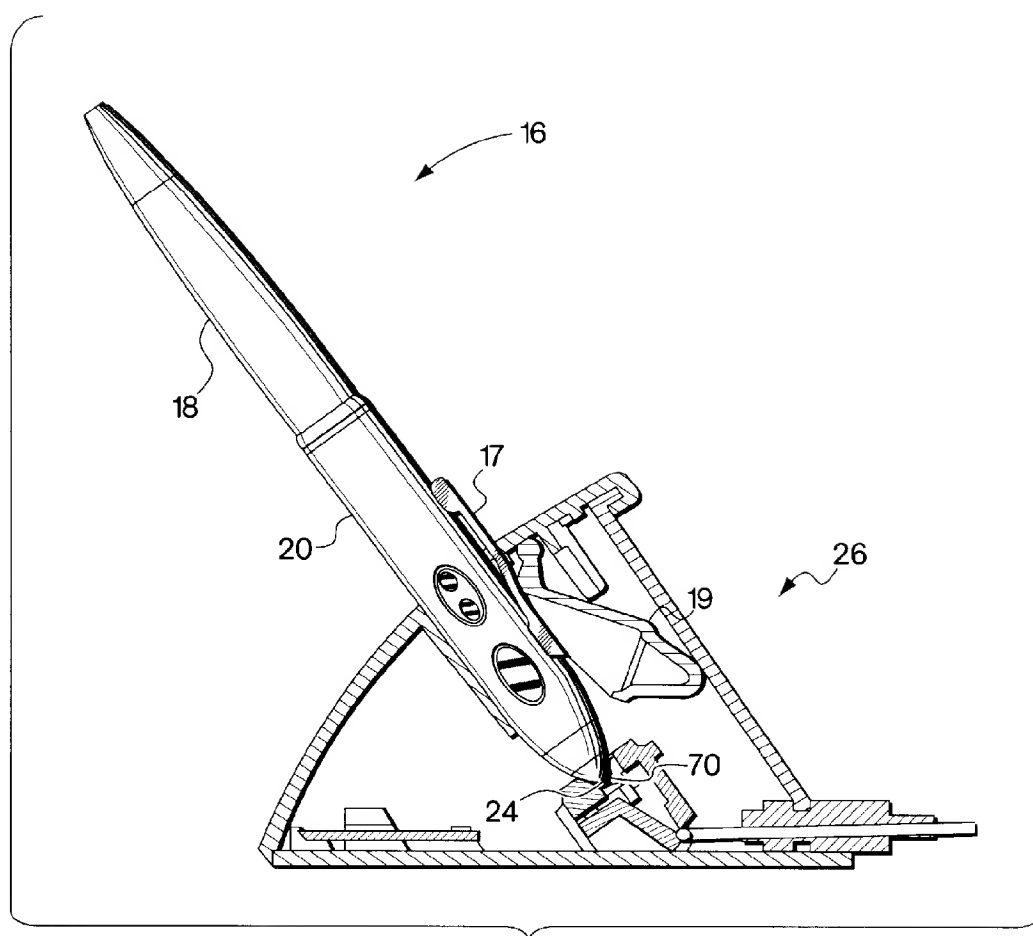


Fig. 3D

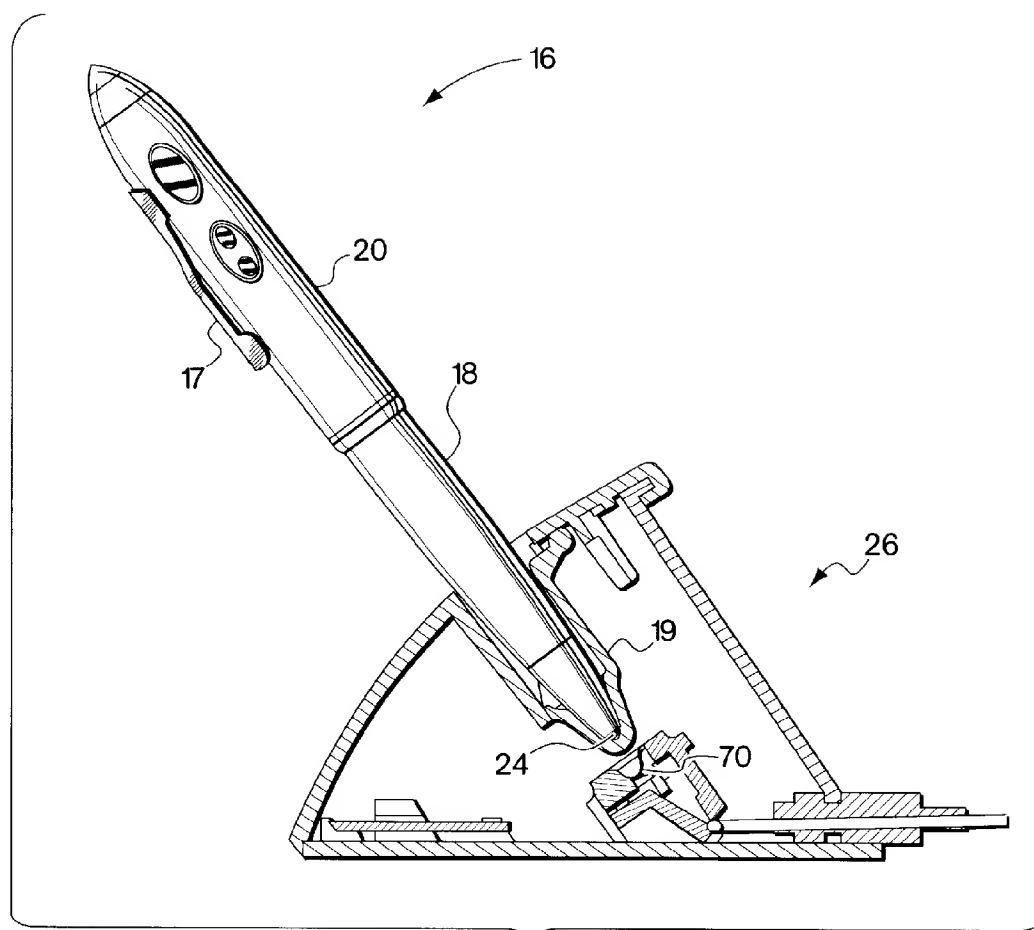


Fig. 3E

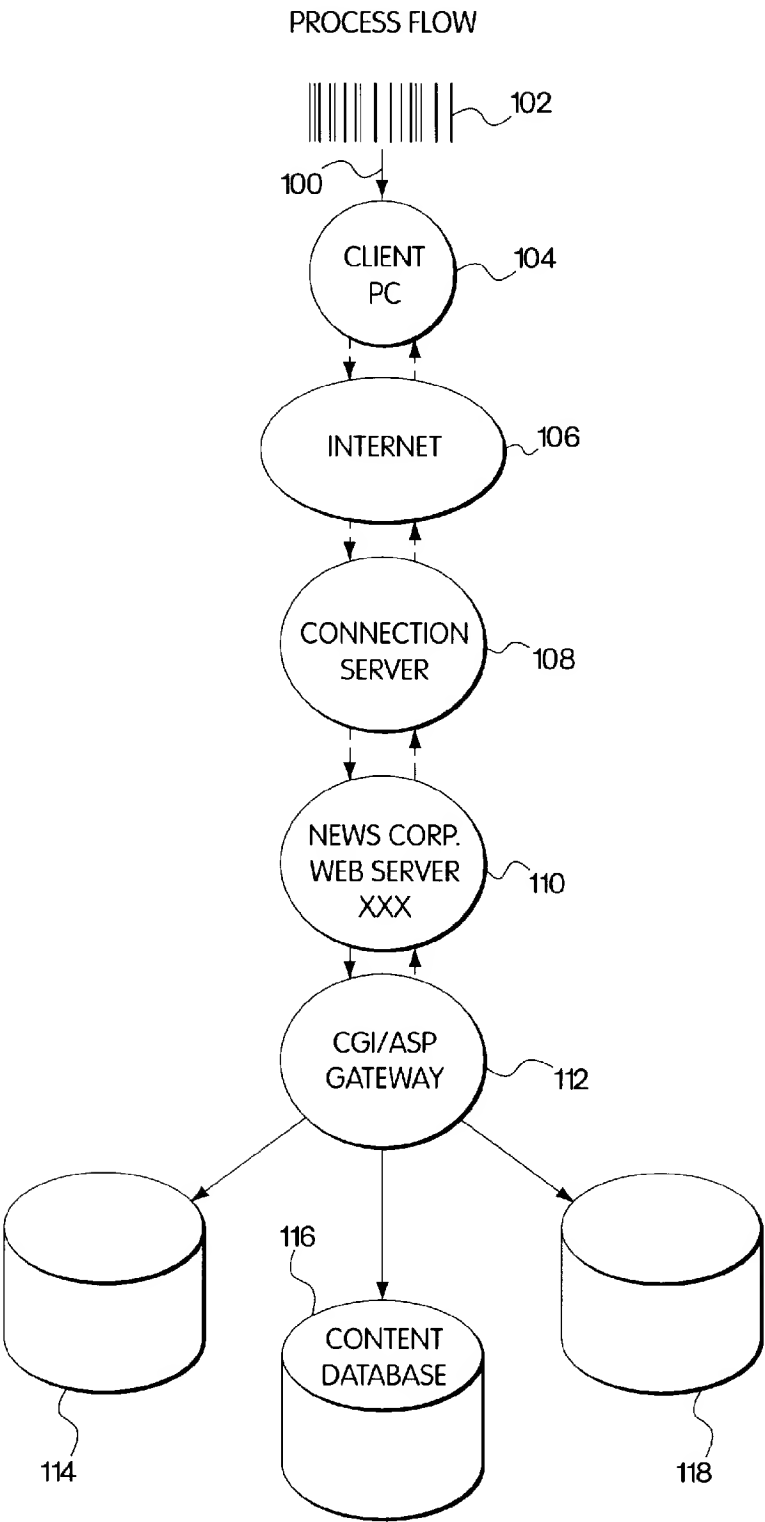


Fig. 4

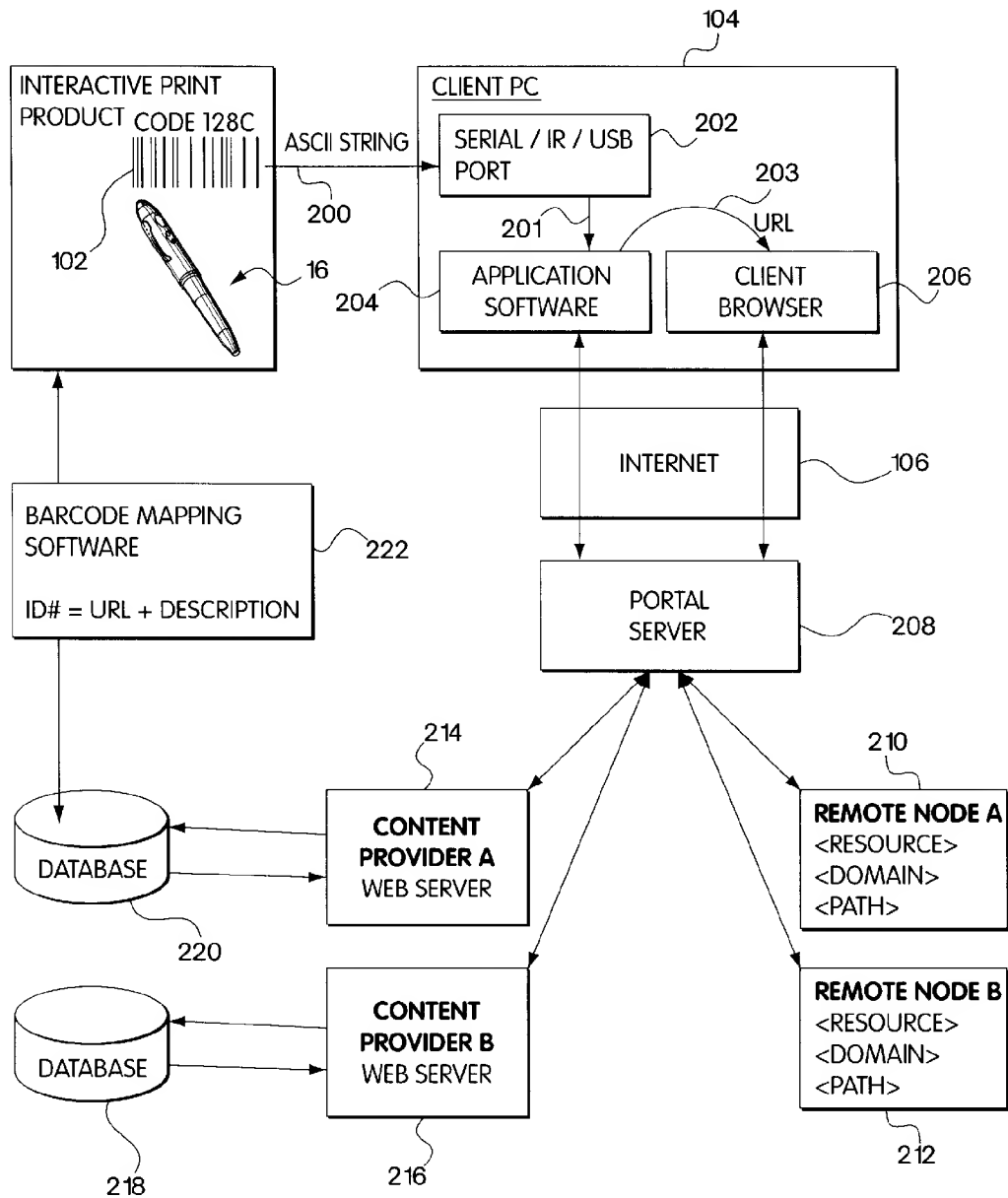


Fig. 5

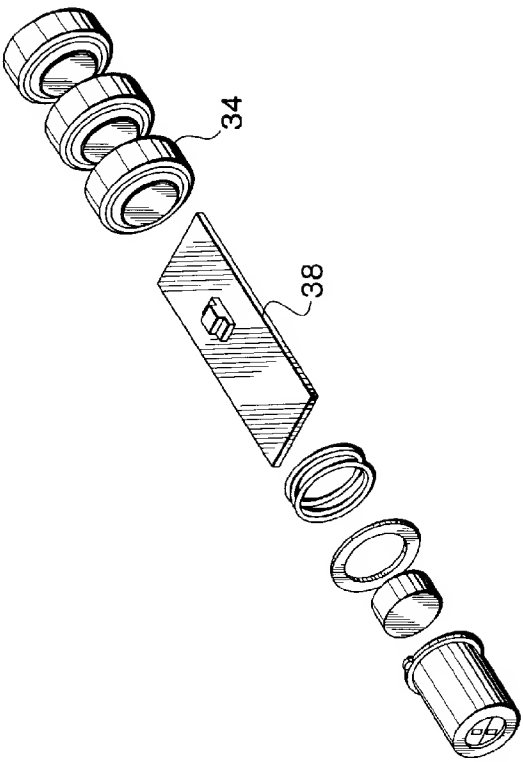


Fig. 6B

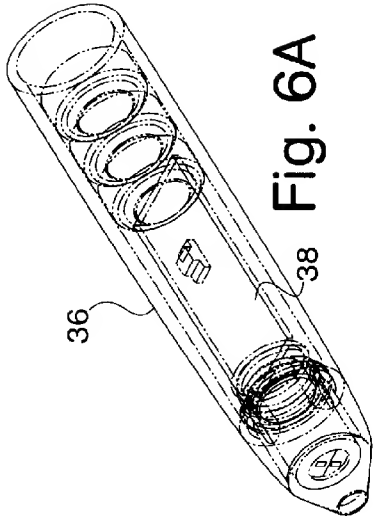
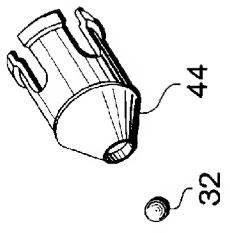
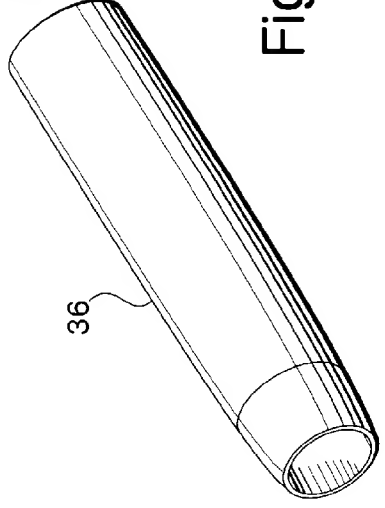


Fig. 6A



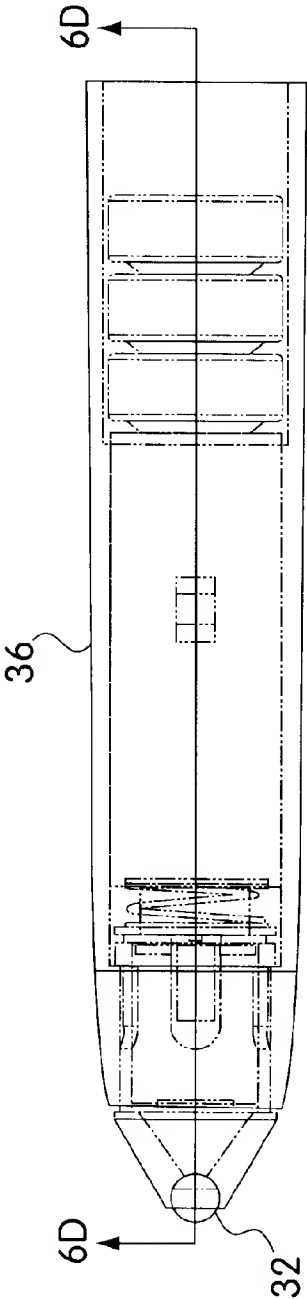


Fig. 6C

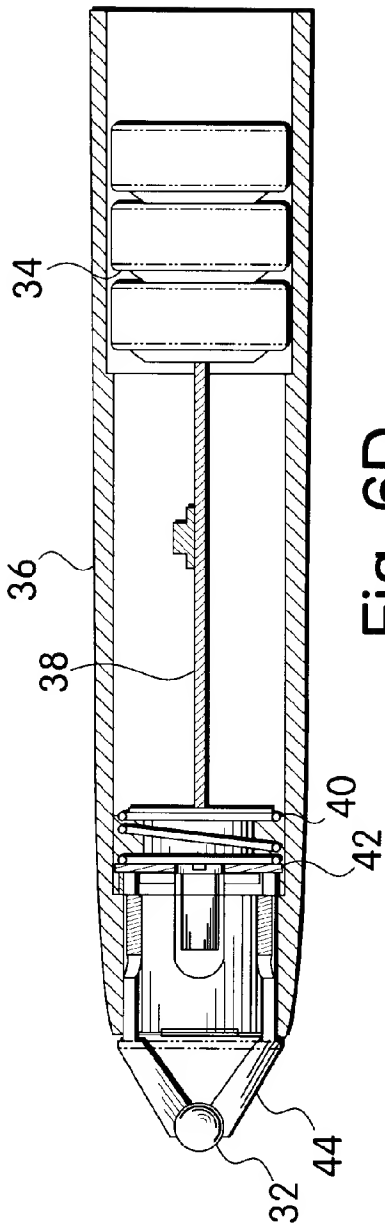


Fig. 6D

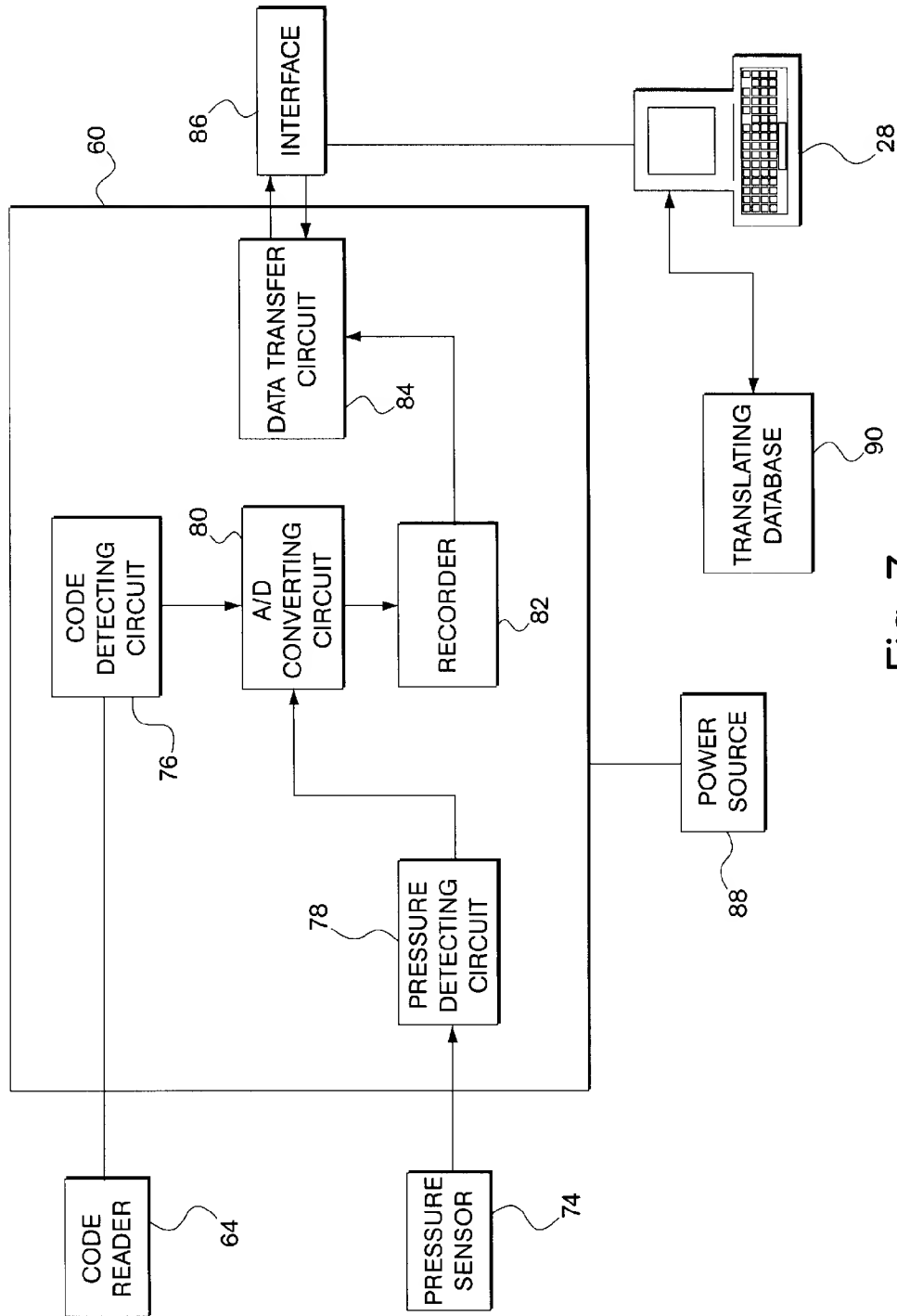


Fig. 7

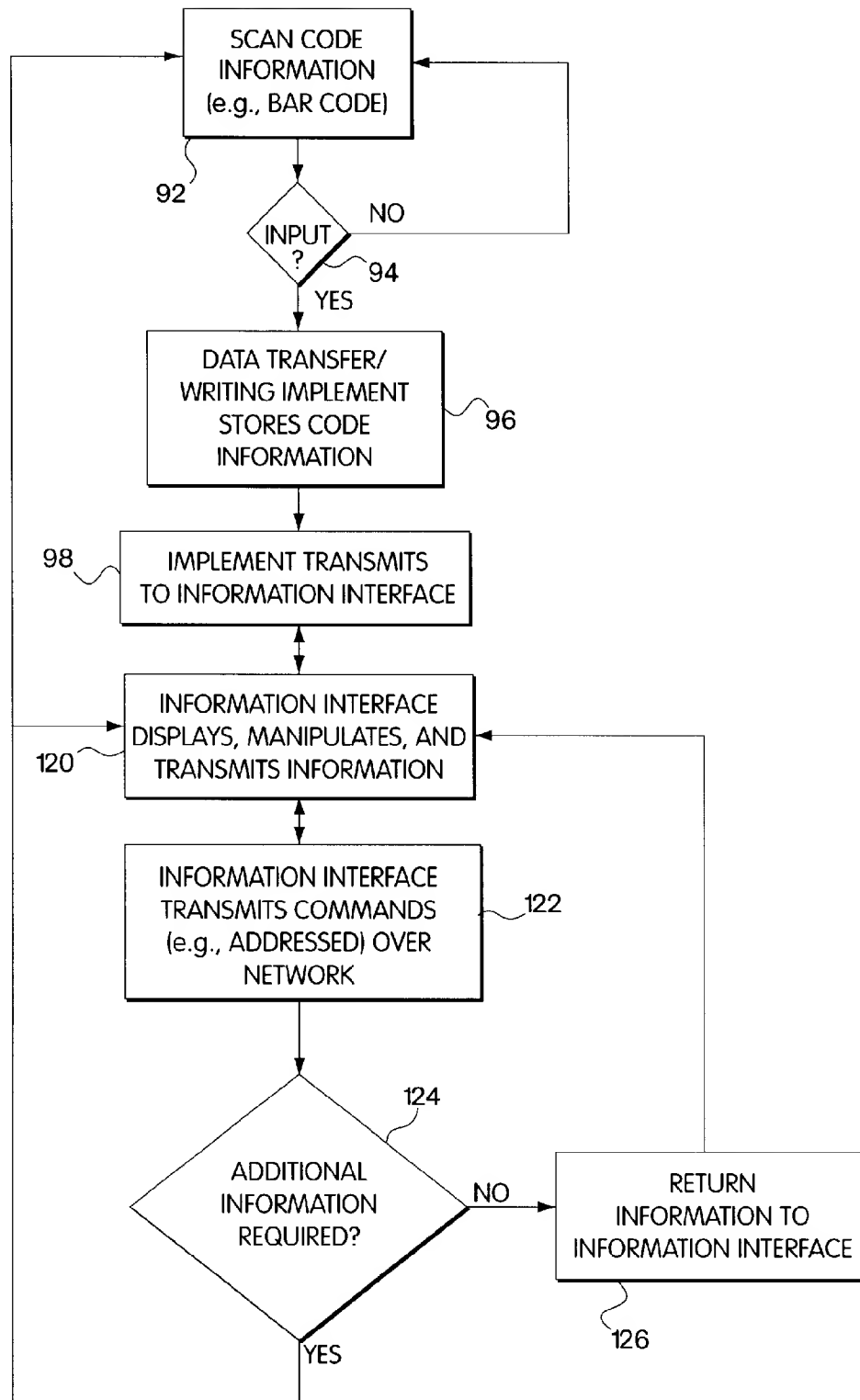


Fig. 8

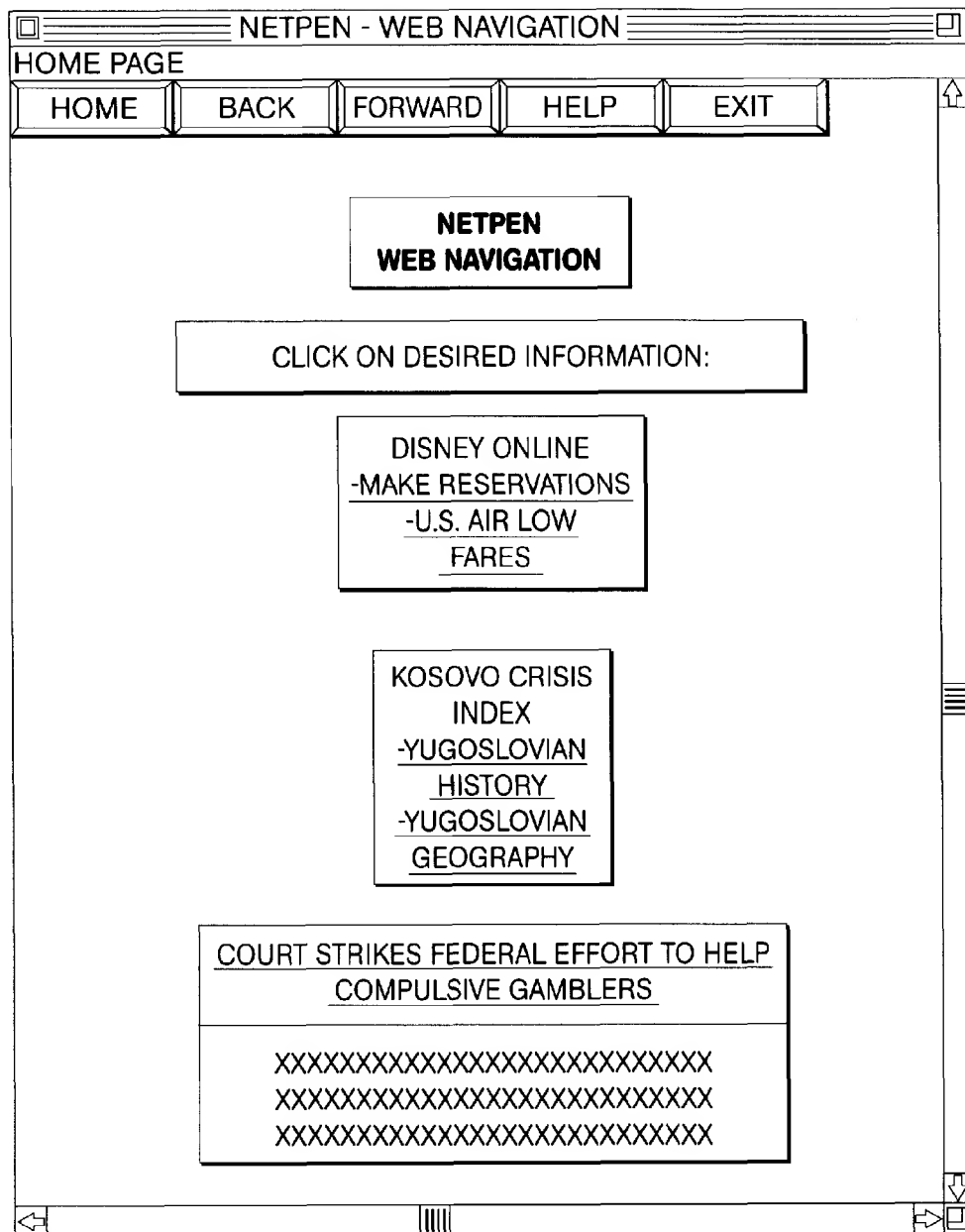


Fig. 9

METHOD AND APPARATUS FOR STORING REFERENCE CODES IN A WRITING INSTRUMENT AND FOR RETRIEVING INFORMATION IDENTIFIED BY THE REFERENCE CODES

RELATED APPLICATIONS

This application claims priority from Provisional Application Ser. No. 60/089,89 filed Jun. 19, 1998, and is a continuation in part of Ser. No. 08/994,684 filed Dec. 19, 1997, now U.S. Pat. No. 5,955,719, both of which are assigned to the assignee of the present application, the A.T. Cross Company of Lincoln, R.I., and both of which are incorporated herein by reference.

FIELD OF THE INVENTION

The present invention relates generally to a method and apparatus for reading and storing reference codes and subsequently retrieving information identified by the reference codes. More specifically, the present invention relates to a system that uses an instrument having an electronic reading, storage and transmission apparatus incorporated therein to read, store and subsequently transmit reference codes to a computer system. The computer system (which may be connected to a worldwide computer network such as the Internet) retrieves information identified by the reference codes.

BACKGROUND OF THE INVENTION

Readers of newspapers and other periodicals typically encounter articles or advertisements that describe subject matter for which they are interested in obtaining additional information. Articles in typical periodicals are limited in the amount of information they can convey because of space constraints and because of the desire to transfer information in a concise manner to a large number of readers. Many of the readers have only limited interest in the subject matter of a particular article.

While the use of concise articles attracts a large number of readers, those readers who wish to obtain more information on the subject matter of an article are often frustrated by the limited content provided in concise articles. These frustrated readers will often times read several periodicals or utilize online internet news and information services to obtain the information they desire. When using online news and information services, users are typically required to conduct a number of time consuming searches to obtain the information they desire. Thus, a need exists for a simple way of obtaining additional information related to articles of interest.

In addition, in today's every increasing use of catalogues by both consumers at home or at work and by sales personnel working for companies, the user must write down, or otherwise note, the catalog number(s) and often the price(s) for a selected item or items he or she wishes to purchase or order. This is time-consuming and often involves mistakes in recording the appropriate catalog number or in sending the correct catalog number to the company or catalog store. These recording mistakes can lead to a variety of consequences, including non-requested items being sent to the user, incorrect prices, and the need for returns.

Sales personnel, after having visited with customers or clients, must often fill out long order forms related to the products and/or services which have been ordered by customers and must relay such order forms (often by mail or

fax) to a home or company office so that the order form may be processed. Information concerning a method of payment may be sent separately. Authorization for shipment related to the method of payment may also cause delays and confusion.

Furthermore, when a securities client, i.e., a consumer or prospective purchaser of bonds, stocks or other securities, wishes to buy or sell such securities, the client customarily contacts his or her broker or trader over the telephone or fax or in some instances over the Internet and types in or writes down the particular stock or other security and the number of shares of such stock or other security. This may lead to mistakes such as the stock symbol being incorrectly transcribed, the number of shares to be bought or sold being incorrectly transcribed, or an intended "buy" order being transcribed as a "sell" order. Thus, a need exists for a simple, less error-prone way to order items from a catalog or to trade securities.

U.S. Pat. No. 5,496,071 to Walsh, incorporated herein by reference, describes a prior art method in which a reference code is inserted in a periodical article to allow the article to be subsequently referenced and/or indexed using the code. However, the disclosure of Walsh does not provide a system that enables a reader of an article containing a reference code to easily obtain additional information concerning the subject matter of the article. Further, the reference codes utilized in the method disclosed by Walsh typically require an electronic device to read the codes. Periodicals are often read on a train, bus or airplane when the reader would not have access to a typical code reader to allow the reader to record and store the reference code for future use.

U.S. Pat. No. 5,640,193 to Wellner, incorporated herein by reference, describes a method by which a user may scan a printed bar code or alphanumeric I.D. code to obtain information about the object with which the bar or I.D. code is associated through transmittal over a communications medium such as the Internet to retrieve the information.

U.S. Pat. No. 5,764,906 to Edelstein, et al., incorporated herein by reference, discloses an electronic resource annotation/denotation, request and delivery system permitting a user to locate design information on a computer network or system such as the Internet without the user having to know, for example, the universal resource locator (URL) of the desired resource.

U.S. Pat. No. 5,804,803 to Cragun, incorporated herein by reference, describes an information retrieval device designed to obtain information which may be related to the object based on data which is encoded on the object.

U.S. Pat. No. 5,812,776 to Gifford, incorporated herein by reference, relates to methods of processing service requests from a user to a server through a network which may be performed without the use of a URL descriptor to identify the information sought.

PCT Published Application WO98/24036, incorporated herein by reference and published Jun. 4, 1998, describes a data retrieval system which incorporates a bar code reader to access information resources which are contained on the Internet.

PCT Published Application WO97/01137, incorporated herein by reference and published Jan. 9, 1997, describes a system and method for utilizing identification codes on objects to access resources over the Internet relating to those objects.

PCT Published Application WO98/03923, incorporated herein by reference and published Jan. 29, 1998, describes a bar code scanner and computer program to obtain infor-

mation available on the Internet relating to information printed in a newspaper, book, magazine, catalog or other printed material.

PCT Published Application WO98/06055, incorporated herein by reference, also describes a computer coupled with a bar code reader for accessing information on the Internet or an intranet.

SUMMARY OF THE INVENTION

Embodiments of the present invention overcome drawbacks of the above-mentioned publications and provide a method and apparatus for allowing a reader to easily store a reference code associated with a periodical, article, or advertisement using a convenient writing implement. The writing implement includes an electronic data reading, storage and transmission apparatus. Furthermore, embodiments of the present invention facilitate catalog shopping for both customers and sales personnel. Embodiments of the present invention also facilitate trading of securities. Embodiments of the invention produce fewer mistakes than occur in a manual system which requires printing, or otherwise reproducing, numbers or codes.

Previously, and by way of example, a reader of a newspaper or periodical who wanted to record a reference to a particular Internet website, while commuting was required to write down the site's uniform resource locator (URL) on a piece of paper. Later on, the reader would locate the piece of paper, turn on a computer, and type the URL into a web browser.

The systems and methods of the present invention save time by allowing a user to simply scan a code imprinted on an object to perform any of a number of tasks or transactions. The code can correspond to a variety of information such as URL sites. Embodiments of the present invention provide a system in which a detected reference code is transferred automatically to a computer system. The computer system can use an Internet browser to locate Internet sites on the World Wide Web that contain information related to the article, advertisement, catalog item or security associated with the detected reference code.

One embodiment of the invention includes a writing implement. The writing implement includes a writing end and, at the end opposite to the writing end, a data transfer end. The data transfer end reads reference codes associated with coded objects. The data transfer end is then placed into a data well. The data well communicates with a computer or other electronic device via a cable. Alternatively, the data well can communicate with a computer via wireless communication technology. In still another embodiment, the writing implement can communicate directly with a computer using wireless communication technology. The wireless communication technology can include an infra-red or a radio-frequency link. Once the writing implement transmits signals representing the scanned code to a computer, the computer launches an application to bring the computer user to the Internet site or other location which was referenced by the scanned code. Alternatively, when a user logs on to her computer and connects to the Internet, one embodiment of a system according to the invention presents a link or links associated with the scanned code or codes. The links can be presented in association with the user's favorite portal.

Thus, a user can retrieve information relating to newspapers or other periodicals, a customer can order an item from a catalog, and a client can trade stocks or other securities. All of these actions can be performed expeditiously with relatively few mistakes. The present invention facilitates a

user's ability to retrieve information on the Internet or other broad-based computer communication network using an altered version of a commonly-carried writing instrument.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference is made to the drawings which are incorporated herein by reference and in which:

FIG. 1 shows a periodical article having a bar code contained therein;

FIGS. 2(A)–2(E) show an electronic pen used in one embodiment of the present invention for reading the bar code of FIG. 1;

FIGS. 3(A)–3(E) show an interaction of the electronic pen of FIG. 2 with a pen well coupled to a computer system in accordance with one embodiment of the present invention;

FIG. 4 shows a schematic diagram illustrating one embodiment of a system for storing and retrieving information according to the present invention;

FIG. 5 shows a schematic diagram illustrating an alternative embodiment of a system for storing and retrieving information according to the present invention;

FIGS. 6(A) and 6(B) are a perspective view and a perspective exploded view, respectively, of one embodiment of the electronic pen of FIG. 2;

FIGS. 6(C) and 6(D) are a side view and a cross-sectional view, respectively, of the embodiment of the electronic pen of FIGS. 6(A) and 6(B);

FIG. 7 is a schematic block diagram of one embodiment for signal processing for components of the electronic pen of FIG. 2;

FIG. 8 is a flow chart illustrating the operation of the apparatus of FIG. 5; and

FIG. 9 shows a graphical user interface including links associated with codes such as the code shown in FIG. 1, that a user has scanned using the implement of FIG. 2.

DETAILED DESCRIPTION

In embodiments of the present invention, a bar code is placed in proximity to, e.g., at the beginning, middle or end of, an article or advertisement in a periodical. While the term "periodical" is used in this specification, it should be understood that the term is meant to encompass all other forms of printed matter, such as newspapers, magazines, books, cookbooks, labels on articles, etc.

A reader interested in obtaining additional information concerning the subject matter of the article or advertisement utilizes a code reader contained in an instrument such as a pen to read and store a unique code identifying the article. Subsequently, the reader installs the pen in a data well that is designed to receive the unique code from the pen and transmit the code to a computer system.

Alternatively, the pen can communicate directly with the computer. In other words, no physical connection, e.g., no data well, is used. Instead wireless communication technology, such as an infra-red link or other electromagnetic link, is used to allow the pen to communicate directly with a computer.

One embodiment of a computer system according to the invention can also transmit codes or other information through the data well to the pen, or directly from the computer to the pen, for later use by the user. The computer system can contain a database of codes and World Wide Web Internet addresses corresponding to the codes. The computer

system then may access Internet sites corresponding to the addresses associated with the particular code to provide the user with further information related to the subject matter of the article or advertisement. Alternatively, the computer system may have no such database of codes but may rather possess the ability to communicate with a site outside the computer system, which site may contain the database for associating codes to Internet addresses.

Embodiments of the present invention will now be described further with reference to FIGS. 1–8. FIG. 1 shows a periodical article 10 having a first column of text 12 and a second column of text 13. The periodical 10 also includes a bar code 14 located at the bottom of the second column. As discussed above, the bar code may contain a unique identifying code to identify the article. The bar code may be implemented using one of a number of known bar codes formats or may be a unique code designed specifically for use with embodiments of the invention. Further, the bar code may be located at locations other than at the bottom of the article, such as the top of the article or in a margin adjacent the article. In addition, the bar code may be included adjacent a title of the article in an index or table of contents in the periodical. Although the term bar code is used in describing embodiments of the invention, such embodiments are not limited to use with bar codes, but rather may be used with any machine-readable code (such as an alphanumeric code) which is scannable or readable by the implements, e.g., pens, of the present invention.

While in FIG. 1 the reference symbol 10 refers to a periodical containing a bar code 14 located at the bottom of the second column, it may be seen that the article 10 may rather be an order form such as the type found in a home catalog, currently a very popular method for shopping. Thus, columns 12 and 13 can constitute photographs and other descriptions of articles, each of which may be prefaced or followed by an appropriate bar code 14.

One embodiment of the present invention, as illustrated in FIG. 2A, includes an electronic pen 16 with a writing segment 18 and a data transfer segment 20. A consumer can order a selected item that has an associated code using the data transfer end 20 of the writing implement 16 by performing the following steps. A consumer scans the code 14 and inserts the data transfer end 20 of the writing implement 16 into the data well 26 shown in FIGS. 3(A) and 3(D). Upon insertion of the data transfer end 20 of the writing implement 16 signals representing the scanned code are transferred to the computer 28 through cable 30.

Alternatively, the data reader 16 can communicate directly with a personal computer using wireless communication technology, e.g., a radio-frequency (RF) link, an infrared link, or other electromagnetic link, as described further below. In other words, circuits in the data reader both read the code associated with an article and communicate with a personal computer or other electronic device.

Upon transferring signals representing the scanned code to the computer 28, an application on the computer 28 contacts a company's site on a wide-area network, e.g., on the Internet, corresponding to the scanned code. Furthermore, the scanned code can include instructions to order a particular item or items from the company.

In addition to use by consumers for catalog shopping, the present invention may be used by travelling sales personnel. Travelling sales personnel can order any one of a number of items from their own catalog or order book by scanning a barcode 14 associated with a selected item and transferring signals representing the scanned barcode to the computer 28.

Upon receipt of the transferred signals, an application on the computer 28 sends an order to the home office via a wide-area network such as the Internet.

In addition to the above applications, a user or stock broker may secure the purchase or sale of stocks or other securities over, for example, the Internet, by performing the following actions. The user scans a code which corresponds to a particular stock or other security. The user also scans a code for a buy, sell or other type of trade. In addition, the user scans another code for the number of shares of such security to be traded. Obviously, a single bar code may be implemented to perform all three categories of information desired.

FIGS. 2(A)–2(E) show one embodiment of an electronic pen 16 used to read and store the bar code 14. As noted above, the electronic pen 16 is comprised of two segments, a writing segment 18 and a data transfer segment 20. The electronic pen also includes a power source such as batteries 34.

The writing segment contains a conventional pen having a writing tip 22 from which ink is dispensed. The writing segment 18 includes a refill cartridge 58 that has an extraction groove 52 in selected proximity to the distal or writing end of the refill cartridge. A user can insert the refill cartridge 58 into an extraction tool 50 so that the extraction groove 52 on the refill cartridge 58 mates with the slot 51 of the extraction tool 50. The user can then pull on the pen away from the extraction tool 50 in the direction of the longitudinal axis of the implement 16 to remove the refill cartridge 58. Subsequently, a user can simply insert a replacement refill cartridge. As can be seen in FIG. 2(A), the writing segment 18 includes a barrel 19 and a rotating end segment 27. Rotation of the end segment 27 relative to the barrel causes an internal mechanism (not shown) to extend and retract writing tip 22.

The data transfer segment 20 includes a scan tip 24 that is moved across the bar code 14 to read the code. The scan tip 24 can include a polycarbonate window and a sapphire ball. The sapphire ball is preferably transparent. The data transfer segment also includes a data transfer assembly 64. The data transfer assembly includes an analog printed circuit board (PCB) assembly 38 and a digital PCB assembly. The data transfer assembly further includes a sensor 2 and/or transmitter 56 for detecting a code 14 associated with an article 10 and transmitting a signal representing a code to an information interface.

The data transfer segment further includes a button 66, an LED 68, and a speaker 72. The button 66 allows a user to activate the scanning and transmitting function of the transfer segment. The LED 68 and speaker 72 provide the user with audio and visual signals regarding the success of particular scanning or transmitting actions. One version of the electronic pen 16 is disclosed in copending application Ser. No. 08/994,684, filed Dec. 19, 1997, entitled "Data/Penwell" assigned to the same assignee as the present invention, the disclosure of which is incorporated herein by reference.

FIG. 3(A) shows one embodiment according to the invention in which the electronic pen 16 is disposed in a data well 26 that is coupled to a computer 28 through a serial cable 30. FIGS. 3(B)–3(E) are a series of views illustrating the electronic pen 16 being inserted into a data well 26. After one or more codes have been stored in the electronic pen, the electronic pen is placed in the data well 26. The pen transfers the codes to the data well by well-known methods. The data well 26 in turn transfers signals representing the scanned codes through the serial cable to the computer.

In one embodiment of the invention, either end of the pen 16 can be inserted into the data well 26. If the writing segment 16 is inserted into the well 26, the writing segment 16 is held in shutter 19, as shown in FIG. 3(E). However, if the data transfer segment 20 is inserted into the well 26, the clip 17 of the pen 16 engages the shutter 19 and causes the shutter 19 to rotate in the direction of arrow A in FIG. 3(C). Once the data transfer segment 20 is completely inserted in the data well 26 the shutter 19 is rotated out of the pen's way and the data transfer tip comes in operable proximity to the data reader 70, as shown in FIG. 3(D). The data well 26 can then download information stored in the pen 16.

The data well may be implemented utilizing a product manufactured by the A.T. Cross Company of Lincoln, R.I., described in the co-pending patent application entitled "Data/Pen Well", Ser. No. 08/994,684, filed Dec. 19, 1997, referred to previously. In some embodiments of the present invention, the data well may contain a battery charger to charge one or more batteries located in the electronic pen.

In FIG. 3(A), the data well 26 is shown coupled to the computer 28 through a serial cable 30. As understood by those skilled in the art, the data well could alternatively be coupled to the computer using other known techniques such as a wireless link (e.g., a radio frequency (RF) link or an infrared link) shown as reference number 31 in FIG. 3. In another embodiment, the data well could be fully integrated with a personal computer, i.e., the personal computer could have a built in data well for receiving a data reader 16.

In yet another embodiment, the data reader 16 can communicate directly with a personal computer using wireless communications, e.g., a radio-frequency (RF) link, an infrared link, or other electromagnetic link, as noted above. In other words, circuits in the data reader both read the code associated with an article and communicate with a personal computer or other electronic device.

To facilitate such wireless communication, the data transfer tip 24 of the data reader, e.g., electronic pen 16, can include a sapphire ball 32, as shown in FIGS. 6(A)-6(D). The sapphire ball 32 allows at least certain frequencies of electromagnetic radiation, e.g., visible light, to pass through the data transfer tip 24. The sapphire ball 32 can act as a roller ball similar to a roller ball in a ball point pen.

Furthermore, the data reader can include a pressure sensitive switch assembly 38, 40, 42, 44 which activates the scanning assembly in the data reader when pressure is placed on the data transfer tip. The pressure switch assembly includes rolling ball/optical assembly 44 for operating the data transfer tip switch scanning functionality. The pressure switch assembly further includes an analog printed circuit board (PCB) assembly 38, and a switch contact 42 in proximity to a contact spring 40. The contact spring 40 is compressed when pressure is applied on ball 32. When the contact spring 40 is compressed past a certain point the pressure switch is activated.

Thus, in operation, a user would run the sapphire ball 32 of the data transfer tip 24 across the code 14 associated with an article 10 as if writing a line through the code in order to scan the code into the data reader. Alternatively, the electronic pen can include a proximity sensor for sending a signal to the processing circuit 60 of FIG. 7 when the ball 32 is located in proximity to code 14.

As illustrated in FIG. 7, the data reader, e.g., pen, can include signal processing circuitry 60. According to this embodiment, the code reader 64 sends signals to a code detecting circuit 76 which in turn sends detected signals to an analog digital converter 80. Similarly, the pressure sensor

74, including the sapphire ball 32, rolling ball/optical assembly 44, contact spring 40, and switch contact 42, sends signals to the pressure detecting circuit 78 which in turn sends pressure detection signals to the analog digital converter 80.

Under appropriate conditions, i.e., when signals are received from both the code detecting circuit 76 and the pressure detecting circuit 78, the converter 80 sends code detected signals to the recorder 82. Under appropriate conditions, e.g., when the pen 16 is inserted into a data well, the recorder 82 sends recorded signals to the data transfer circuit 84. The data transfer circuit 84 transfers recorded signals to the interface 86 and receives input signals from the interface 86. The interface 86 interfaces with a computer 28 which has access to a translating database 90 for translating recorded code signals into another form of information, e.g., a uniform resource locator address.

In one embodiment, the data reader 16 includes a bar code reader of a type which is available from Symbol Technologies, Inc. of Holttsville, N.Y. However, in alternative embodiments, other types of scanners, e.g., laser-based scanners, can be contained in the data transfer portion of the electronic pen 16. Such alternative scanners can be capable of reading alphanumeric symbols or other indicia in addition to, or in lieu of, bar code symbols.

One embodiment of a method according to the present invention includes the following steps, as illustrated in FIG. 8. First a user scans 92 coded information located in proximity to an item, e.g., an article. The system determines 94 whether the coded information was detected. If the information was detected, the data reader stores 96 the code information. The data reader then transmits 98 the code information to an information interface. The information interface, which can be a computer or other electronic device, displays and manipulates 120 information, as will be described further below. The information interface also transmits 122 information, e.g., a URL address, over a network. The system then determines if additional information is required 124. If more information is required an appropriate request is displayed at the information interface. Otherwise, the requested information is returned to the information interface.

In one embodiment of the present invention, the bar code is implemented using a bar code having 6 to 12 numeric characters in a size format that is small enough to be unobtrusively placed in a periodical article or advertisement, yet large enough to be clearly read by a data reader, e.g., an electronic pen. For articles or advertisements contained in newspapers, it is desirable to use larger bar codes because of the relatively poor quality of print used in typical newspapers. In one embodiment, the bar code includes a numeric string designated as $X_1 X_2 X_3 X_4 Y_1 Y_2 Y_3 Y_4$, where the X values are used to designate one of 10,000 periodicals, and the Y values are used to designate one of up to 10,000 articles associated with the periodical. Similarly, the X values and Y values may be used to note a particular catalog and items in that catalog or a particular stock and quantities of that particular stock or other instrument.

In embodiments of the present invention, the computer 28 is programmed to receive codes from the data well, and upon receiving a code, to access a database contained either within the computer or at a remote location, e.g., using the Internet. In one embodiment, by way of example, a remote database is accessed by the computer through an Internet server using one of a number of known web browsers. The database provides an Internet home page URL address

corresponding to the first four characters of the numeric string, and the computer system connects to the internet site corresponding to the URL address using the web browser. At the Internet site, the last four characters of the numeric string are used to identify the address of a home page corresponding to the particular article or advertisement or product or stock whose bar code was scanned by the reader.

In embodiments of the present invention, the home pages corresponding to articles or advertisements may be maintained by a print publisher such as a newspaper or magazine, while the database of periodicals may be maintained by a service agency to which both readers and publishers could subscribe. In further embodiments of the present invention previously described, a catalog company may maintain a home page to which a catalogue customer may send an order for one or more items within the company's catalogue. Similarly, a salesperson's home office may maintain a home page or other Internet site to which orders may be forwarded for the salesperson's customers. Finally, the stock brokerage or other investment firm may maintain a home page or other Internet site such that its customers or clients may trade stocks and other securities over the Internet by scanning the code corresponding to a particular stock and the number of shares of that particular stock as well as whether it is a buy, sell or other transaction.

The manufacturer or seller of the electronic pen may by itself or with others provide differing types of computer services to users of the electronic pen. In one embodiment, the manufacturer or seller could make available a server which provides organizational and navigation services to users of its electronic pen, whereby gateways to other services, websites and other databases are connected through the manufacturer's or seller's server. Information gathered by such server may be kept by the manufacturer or seller for the purposes of demographic statistics and subsequently sold to others.

In a second embodiment, in contrast to the first embodiment where it acts as a "go-between", the manufacturer or seller could provide its own server with the information represented by the bar code discussed above, and may garner revenue from provision of such information. Additionally, the company may provide the service to users performing searching on other Internet sites or other databases for information requested by a user which is not already provided on its server, and charge fees for such access and service. Obviously, the provision of such services in the above embodiment may be provided by entities other than the manufacturer or seller of the electronic pen, such as a service bureau or a publisher, like a newspaper.

FIG. 4 illustrates yet another embodiment of the present invention. FIG. 4 illustrates a method of implementing what is known in the industry as a "hard" portal which is, for the purposes of this application, defined as a server or group of servers that are in continual communication with a client machine regardless of where the customer or user is on the Internet. One example of this is a service provided by America Online, Inc. (AOL). A preferred manner of providing a hard portal service is to install appropriate application software on the clients/customers/user's machine and to allow the application to run behind the browser, according to well-known techniques. In this way, the application stays in contact with the portal server, and the browser can serve up content anywhere on the Internet.

FIG. 4 illustrates in a flow chart format one embodiment of a process according to the present invention by which a user retrieves information starting with the scanning of a bar

code or other alphanumeric symbol. In the first step 100, the user scans a bar code 102 using the implement of the present invention. The scanning implement converts the scanned bar code 102 into a signal representing the scanned bar code 102. The system then transmits the signal representing the scanned bar code 102 to the client's personal computer (PC) 104.

Software on the client's PC receives the signal representing the scanned bar code and runs a browser installed on the client PC 104. The software uses the browser and the signal representing the scanned bar code to connect over the Internet 106 to a connection server 108.

In one embodiment the bar code uses code 128. Furthermore, the bar code can support a sufficient number of characters to encode the application type (interactive print, catalog shopping, securities transaction, etc.), the associated corporation or company or other entity, and the address of the associated article.

The bar code may be divided into two fields: a static field and a dynamic field. The static field may identify the application type (e.g., interactive print) and the corporation or other entity (i.e., *The Washington Post*). The dynamic field may be used to specify a particular article in a content database. The connection server 108 acts as a proxy for the client's PC in that it associates a static field within the bar code with a content provider, e.g., Newsweek or the Washington Post, a catalog company, or a particular stock broker. In other words, the connection server 108 filters out the static information and directs requests to the particular news agency server 110 based on information in the static field.

The news agency server 110 implements a common gateway interface (CGI) process to dynamically map between a filtered bar code and a corresponding Uniform Resource Locator (URL). The URL refers to specific articles in content databases 114, 116 and 118. Multiple URLs can be associated with a single bar code. The connection server 108 then relays these URLs from the News Corp Web server 110, through the Internet 106, to the client PC 104.

One method of providing a bar code to Internet connection is the indirect method disclosed in published PCT application assigned to Solar Communications of Naperville, Ill., WO97/01137, the text of which is incorporated herein by reference. This PCT application concerns, among other things, a database that relates existing uniform product code (UPC) numbers found on products like soup or soda to Internet URLs. However, Solar Communications' application teaches an input device, i.e., UPC bar code reader, that is attached to a computer. Solar Communications' application does not teach a free and independent data reader that can be used in a variety of environments, e.g., on a train or on an airplane, and subsequently interfaced with a computer to download information obtained by the data reader.

FIG. 5 illustrates in a flow chart format an alternative embodiment of a process according to the present invention. According to this embodiment, a user initiates the retrieval of information related to an article by scanning bar code(s) 102 or other alphanumeric symbol(s) using implement 16. As noted above, the code(s) can include multiple fields. The fields can identify a particular software application, a particular database or content provider, and a particular article within a particular database. The scanning implement 16 converts the scanned code(s) 102 into a signal representing the code(s) 102.

In step 200, the system transmits the signals representing the scanned code(s) to the client's personal computer (PC)

104. In one embodiment, the system can transmit the signals as an ASCII string. Furthermore, the client PC receives the signals through a port 202. The port can be any one of a variety of ports, such as a serial, infrared, or radio-frequency port.

A software application 201 on the client's PC 104 receives the signals representing the scanned code(s) and runs a browser 206. The application 201 filters the signals and/or connects via the Internet 106 and Portal Server 208 to Remote Nodes 210, 212 to determine URLs and other information associated with the scanned bar code(s). In step 203, the application 201 sends the browser 206 the associated URLs and other information. As shown in FIG. 9, the browser then displays the information, e.g., as links. One embodiment of a system according to the invention can integrate links associated with scanned codes into a user's favorite search engine or portal.

A user provided with a variety of links based on previously scanned codes can then select one of the links. The browser 206, activated by the selection of a link, connects via the Internet 106 and the CrossLink Portal Server 208 to a content provider 214 or 216 and to a particular article located in a database 220 or 218 supported by the content provider 214 or 216. In addition, bar code mapping software 222 can map bar codes to articles in a database 220 supported by a content provider 214.

In embodiments of the present invention described above, a code reader is incorporated into a pen. In other embodiments, the code reader may be incorporated in other writing instruments, or may be incorporated in some other, preferably portable, device such as a watch, cellular phone, etc. In still other embodiments, the code reader may be a stand-alone portable device designed to easily fit within a pocket or brief case and may be even incorporated into a laser-pointer-type shaped device which may be attached to a user's keychain.

In another embodiment of the present invention, in place of the bar code, standard characters are used in articles or advertisements as identifying codes, and the electronic pen includes an electronic scanner capable of reading characters. For this embodiment, the computer system includes character recognition software to identify the characters read by the electronic scanner.

While the present invention has been described as being useful in the interactive print, catalog and securities industries, it has utility in a number of other industries and applications. Examples include the following: the utilization of bar or other codes in an encyclopedia to link the user to further information; use of codes in yellow pages or other directories; use of codes for e-commerce banking, wherein a user can scan, for example, an electric utility bill code and pay such bill over the Internet. Other examples include foreign language translation, wherein scanning a code on an object may link the user to a foreign language translation source over the Internet. Yet another example may be interactive shopping wherein the user may scan a number of home products or foodstuffs and order such items by connecting to a supermarket's Internet web site. A further example is the use by poll takers who may scan a particular code which corresponds to the choices of the person or persons being polled.

A still further example is the use of the present invention for standardized test purposes. In this application, a student's or other user's choices are scanned. Once a testing sequence is over, the electronic pen may be utilized to link the answer's to the testing authority's Internet web site,

facilitating instant feedback, fewer false hits compared to present pencil-marking techniques due to the accuracy of bar code vending techniques and instant statistical analysis through cumulation of many users' test scanners.

In still another embodiment, the electronic pen has an audio recording module in place of the bar code reader, enabling a user to record an Internet URL address in the recording module. In this embodiment, the pen well includes circuitry to receive the URL address from the electronic pen, either acoustically or electronically, and to transfer the URL address to the computer system. For this embodiment, the computer system contains a voice recognition engine and is programmed to receive the URL address, and upon receipt, to enable a web browser to access the Internet site having the URL address.

In yet another embodiment, the electronic pen has accelerometers capable of detecting and recording in electronic format characters written by the pen. Such an electronic pen is described in U.S. Pat. No. 5,434,371, entitled "Hand-Held Electronic Writing Tool", incorporated herein by reference and assigned to the A.T. Cross Company, of Lincoln, R.I. In this embodiment, a user can trace a URL address in an advertisement or article or write the URL address on paper to record the URL address (or some other code) in the pen. The URL address may then be transferred to the computer in a similar manner to that described above for the other embodiments of the present invention.

In embodiments of the present invention discussed above, a data well is used to transfer stored information from an electronic pen to a computer system. As understood by those skilled in the art, other adapters may be used to transfer information in place of the data well, or alternatively, the electronic pen may be inserted directly into a port in the computer that is designed to receive stored information from the pen. In addition, the pen may communicate with the computer through an infra-red or RF link.

There are several advantages to embodiments of the present invention discussed above. First, service agencies using embodiments of the invention can provide publishers with demographics of readers to assist the publishers in targeting advertisements to particular groups of readers. Second, readers can easily obtain additional information related to the content of articles or advertisements in periodicals. Third, since advertisements containing the bar codes will have the potential of transferring additional information to readers, publishers will be able to derive additional revenues from advertisements. Although it is common for advertisements to contain URL addresses to Internet sites from which readers can obtain additional information, prior to the present invention, readers often lose or forget the URL addresses, before accessing the Internet site.

Having thus described at least one illustrative embodiment of the invention, various alterations, modifications and improvements will readily occur to those skilled in the art. Such alterations, modifications and improvements are intended to be within the scope and spirit of the invention. Accordingly, the foregoing description is by way of example only and is not intended as limiting.

What is claimed is:

1. An elongated implement for use in writing and data recordation having first and second end portions, the first end portion being a writing end and having a writing tip at an end of the first end portion, the second end portion being a data transfer end and having a scan tip at an end of the second end portion, wherein the writing tip and the scan tip are disposed on diametrically opposite ends of the implement.

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2. The implement of claim 1, the writing tip includes a cartridge adapted to supply ink to the writing tip.

3. The implement of claim 2, wherein the writing tip is adapted to be retractable within the first end portion and extensible from the first end portion.

4. The implement of claim 1, wherein the second end portion includes electronic circuitry adapted to record indicia positioned upon a surface.

5. The implement of claim 4, wherein the circuitry adapted to record indicia is bar code reader circuitry.

6. The implement of claim 5, wherein the indicia to be recorded is a bar code.

7. The implement of claim 6, further including a power supply to power the electronic circuitry located in the second end portion.

8. The implement of claim 7, wherein the scan tip includes an optically transparent tip, the optically transparent tip being adapted to permit the recordation of the bar code positioned upon the surface by the electronic circuitry located in the second end portion.

9. The implement of claim 8, wherein the scan tip further includes a proximity means for allowing the scan tip to scan the indicia when the scan tip is proximate the bar code.

10. The implement of claim 9, wherein the optically transparent tip includes a polycarbonate window.

11. The implement of claim 10, wherein the optically transparent tip further includes a sapphire ball.

12. The implement of claim 11, further including a speaker and an optical indicator to indicate to a user the implement commencement and completion of recordation of the bar code.

13. The implement of claim 8, wherein the second end portion further includes electronic circuitry adapted to transfer the recorded bar code through the optically transparent tip to a computing device.

14. The implement of claim 13, wherein the second end portion further includes a communication mechanism for wireless communication with the computing device.

15. The implement of claim 13, wherein the computing device is coupled to a data well that is operative to interface with the implement.

16. The implement of claim 15, wherein the data well includes:

a housing with an opening dimensioned to receive the data transfer end of the implement;

a communications port operatively coupled to the computing device to provide data to the computing device;

a data communication device contained in the housing for interfacing with the scan tip when the data transfer end of the implement is received in the opening, wherein the computing device is programmed to receive data from the data well, the received data including data indicative of at least one address on a global communications network, the computer device also being programmed, upon receipt of the at least one address, to launch an application to retrieve information related to the at least one address from the global communications network and to transmit such information to the computing device.

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17. The implement of claim 16, wherein the global communications network includes the Internet.

18. The implement of claim 17, wherein the computing device includes a display device to display information retrieved over the Internet.

19. The implement of claim 16, wherein the data well is contained within the computing device.

20. The implement of claim 16, wherein the computing device includes:

a communication mechanism for communicating with the elongated implement, the communication mechanism having a receiving assembly for receiving the indicia from the scan tip of the elongated implement; and,

wherein the computing device is programmed to receive indicia from the communication mechanism, the received indicia including data indicative of at least one address on a global communications network, the computing device also being programmed, upon receipt of the at least one address, to launch an application to retrieve information related to the at least one address from the global communications network and to transmit such information to the computing device.

21. The implement of claim 20, wherein said communication mechanism provides for wireless communication links, including an infra-red link or a radio-frequency link.

22. An elongated implement for use in writing and data recordation having a first end and a second end diametrically opposite the first end, the first end having a writing tip, the second end including means for scanning and transferring data.

23. The implement of claim 22, wherein the writing tip includes means for supplying ink to the writing tip.

24. The implement of claim 23, wherein the writing tip includes means for retracting the writing tip within the first end and means for extending the writing tip from the first end.

25. The implement of claim 22, wherein the second end includes means for recording indicia positioned upon a surface.

26. The implement of claim 25, wherein the indicia is bar code indicia.

27. The implement of claim 26, further including means for supplying power to the means for recording bar code indicia located in the second end.

28. The implement of claim 27, wherein the means for scanning further includes means for controlling the means for scanning to scan the bar code indicia when the means for scanning is proximate the bar code indicia.

29. The implement of claim 28, further including means for communicating to a user the implement commencement and completion of recordation of the bar code indicia positioned upon the surface.

30. The implement of claim 29, wherein the second end further includes means for transferring the recorded bar code indicia to a means for computing.

31. The implement of claim 30, wherein the means for computing includes means for interfacing with the implement.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 6,446,871 B1
DATED : September 10, 2002
INVENTOR(S) : Buckley et al.

Page 1 of 1

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 12,

Line 63, change “,of” to -- of --.

Column 13,

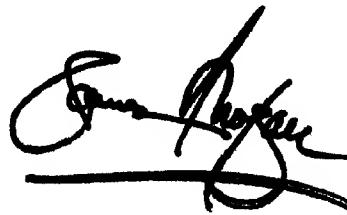
Line 51, insert a paragraph break after “opening.”.

Column 14,

Line 29, delete “it”.

Signed and Sealed this

Fourth Day of February, 2003

A handwritten signature in black ink, appearing to read "James E. Rogan", with a horizontal line drawn underneath it.

JAMES E. ROGAN
Director of the United States Patent and Trademark Office



US005903225A

United States Patent [19]**Schmitt et al.**[11] **Patent Number:** **5,903,225**[45] **Date of Patent:** **May 11, 1999**

[54] **ACCESS CONTROL SYSTEM INCLUDING FINGERPRINT SENSOR ENROLLMENT AND ASSOCIATED METHODS**

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[73] Assignee: **Harris Corporation**, Palm Bay, Fla.

[21] Appl. No.: **08/857,523**

[22] Filed: **May 16, 1997**

[51] **Int. Cl.**⁶ **H04Q 1/00**

[52] **U.S. Cl.** **340/825.31; 340/825.34; 235/380; 235/382.5; 380/23**

[58] **Field of Search** **340/825.31, 825.3, 340/825.34, 825.54, 825.69, 825.72; 235/380, 382.5; 70/276-8; 380/23**

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Primary Examiner—William A. Cuchlinski, Jr.

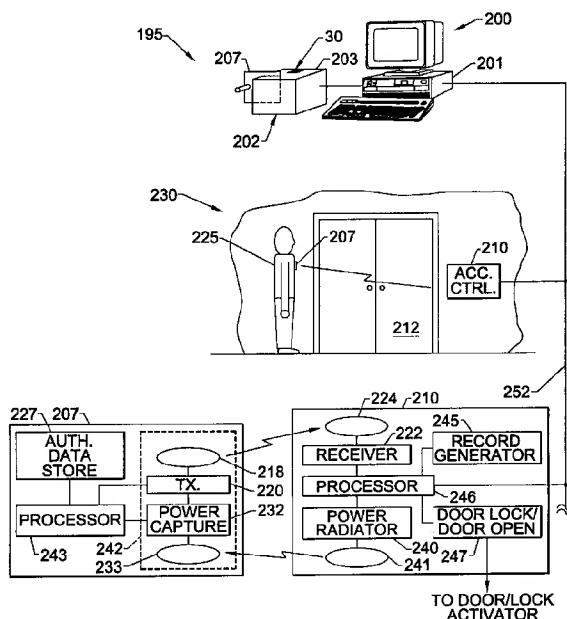
Assistant Examiner—Yonel Beaulieu

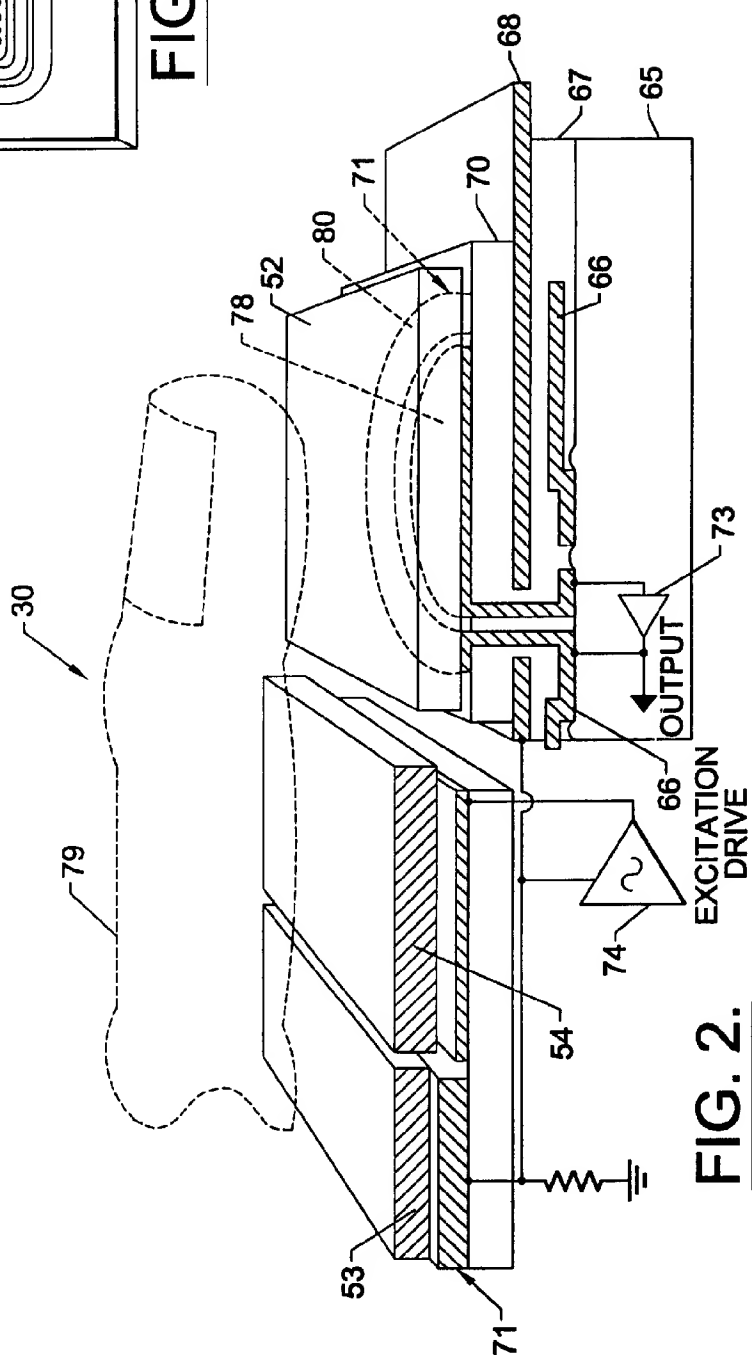
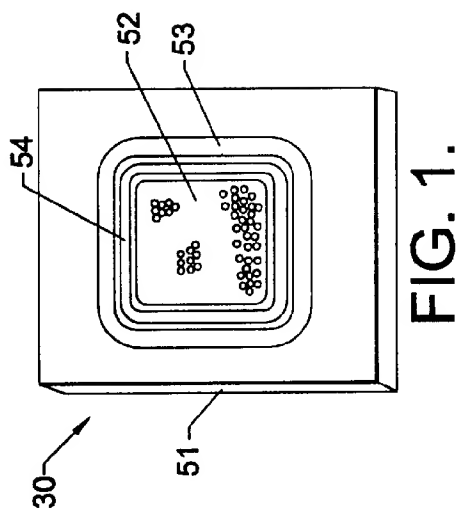
Attorney, Agent, or Firm—Allen, Dyer, Doppelt, Milbrath & Gilchrist, P.A.

[57] **ABSTRACT**

An access control system includes a fingerprint enrolling station for sensing a fingerprint of a person and enrolling the person as an authorized person based upon the sensed fingerprint. The system also includes an access triggering device to be carried by the authorized person, and an access controller for granting access to an authorized person bearing the access triggering device. The access triggering device preferably cooperates with the enrolling station to store authorization data for an authorized person based upon the sensed fingerprint. The access triggering device also preferably includes a wireless transmitter, such as a passive transponder, for transmitting an authorization signal related to the stored authorization data. In addition, the access controller preferably includes a wireless receiver, such as including a transponder powering circuit, for receiving the authorization signal and granting access responsive to the wireless transmitter being in proximity to the wireless receiver. The authorized person bearing the access trigger device may unobtrusively be granted access merely by approaching the access location.

24 Claims, 6 Drawing Sheets





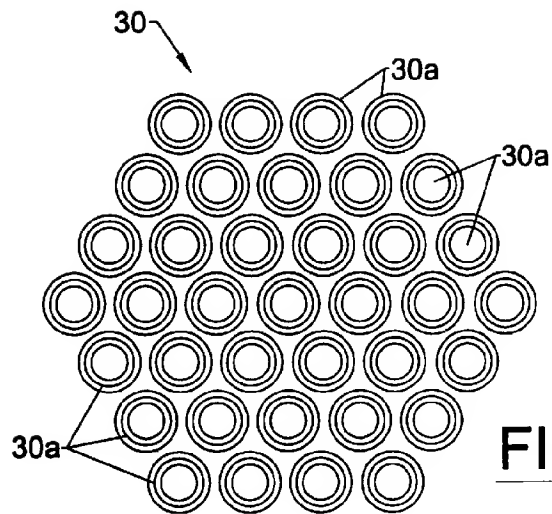


FIG. 3.

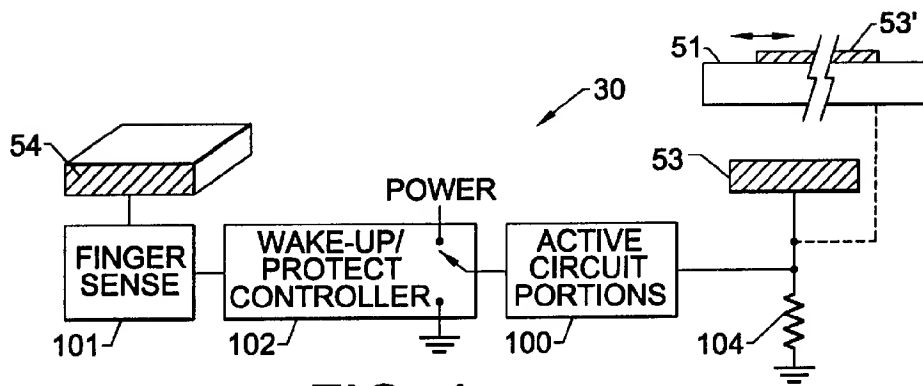


FIG. 4.

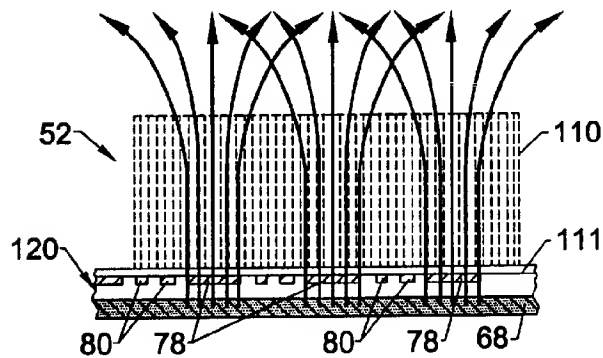


FIG. 5.

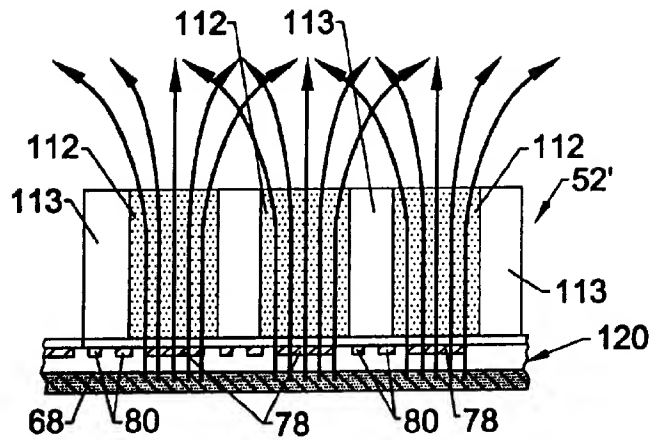


FIG. 6.

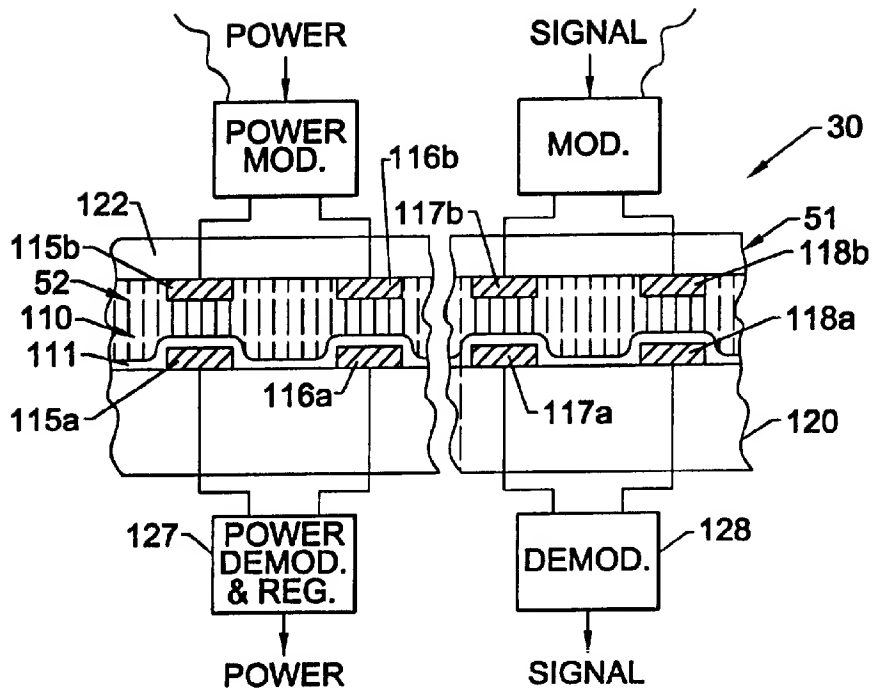
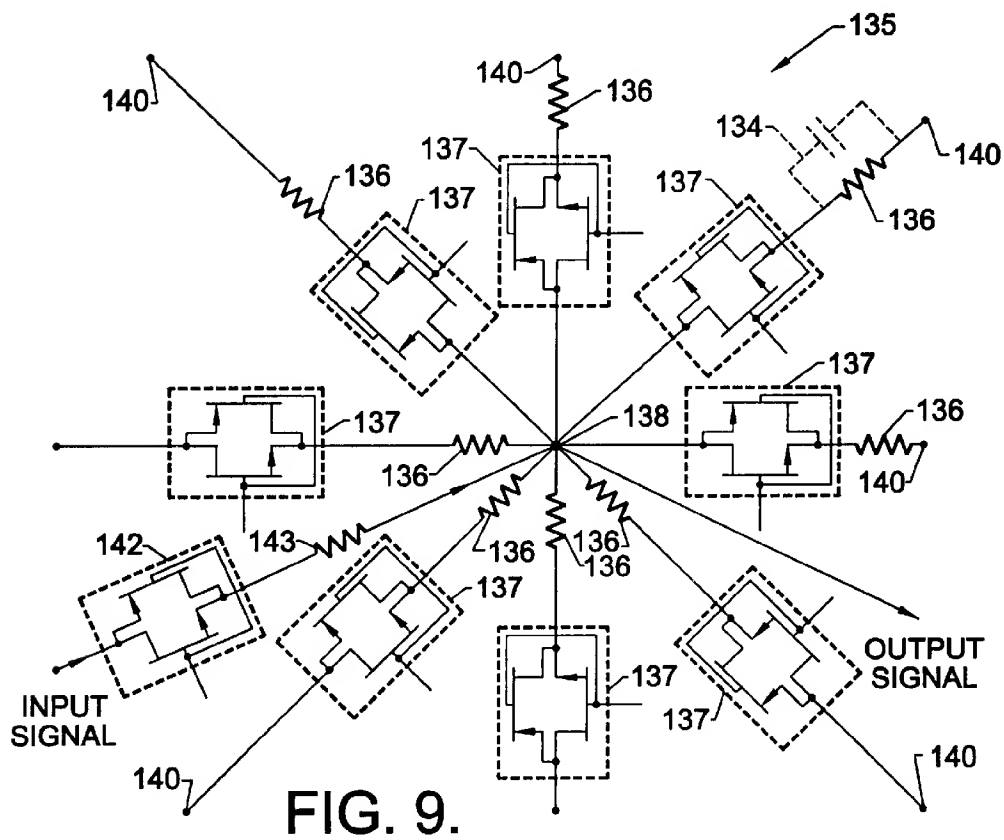
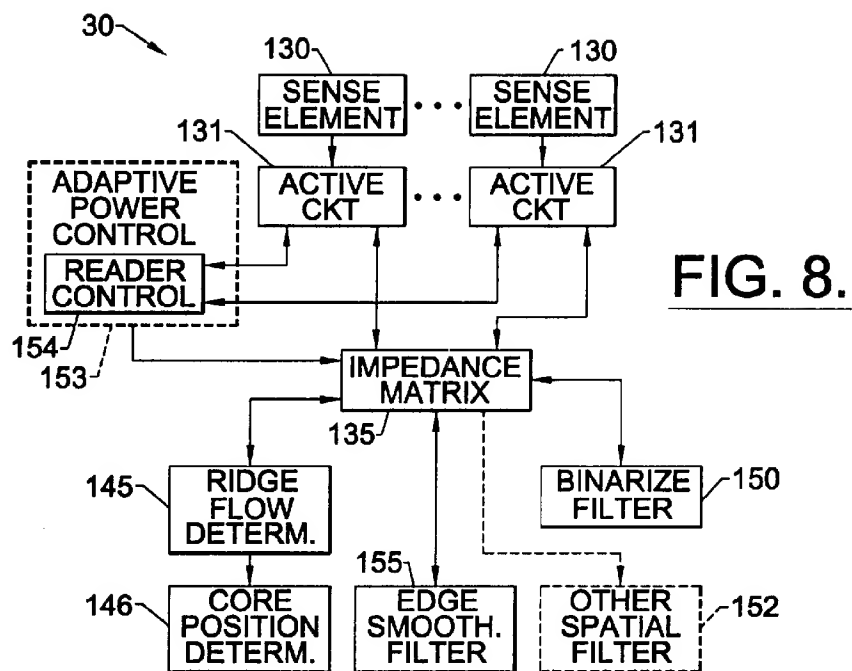


FIG. 7.



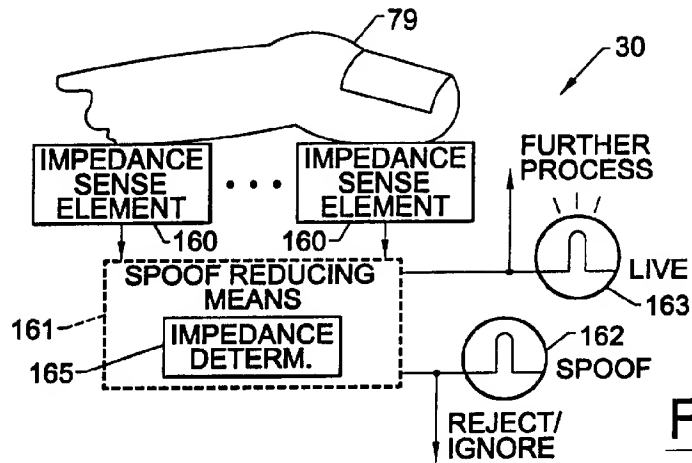


FIG. 10.

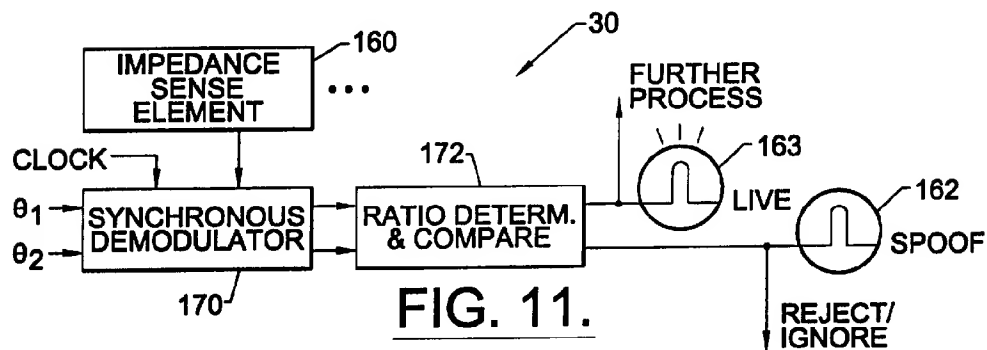


FIG. 11.

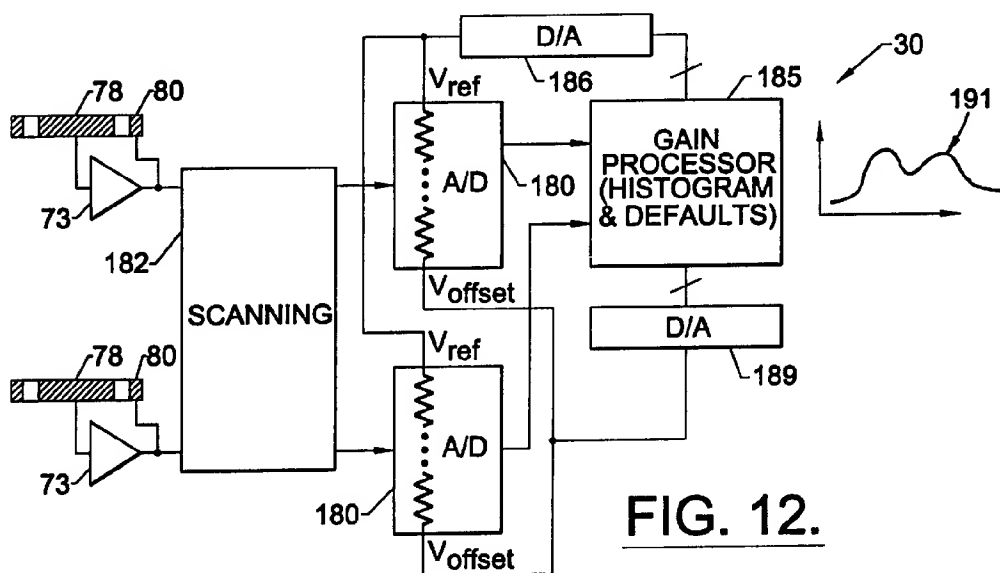
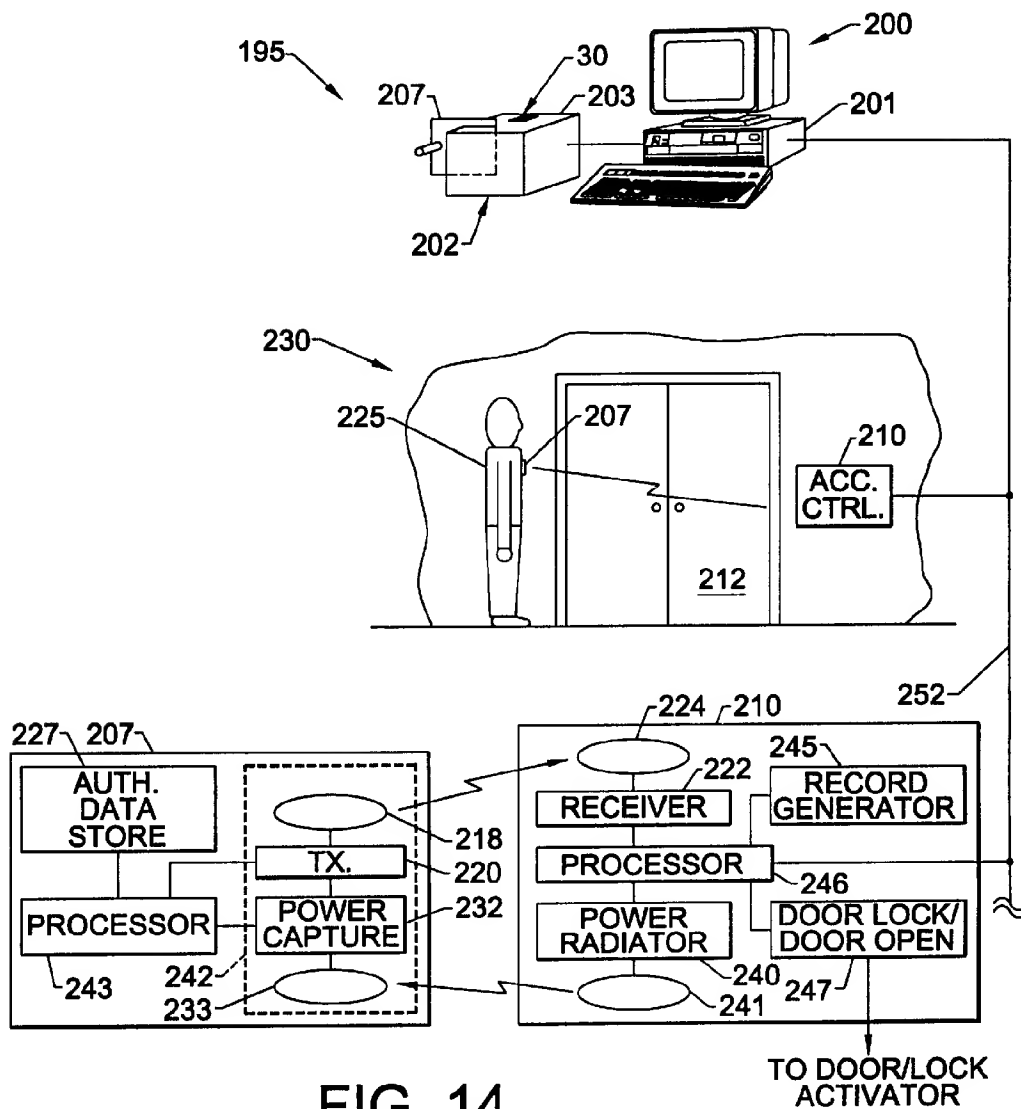
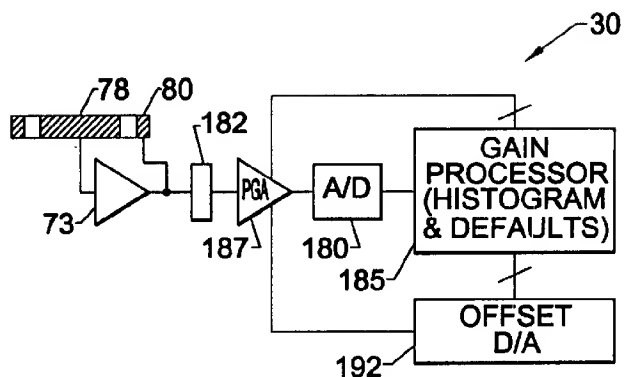


FIG. 12.



ACCESS CONTROL SYSTEM INCLUDING FINGERPRINT SENSOR ENROLLMENT AND ASSOCIATED METHODS

FIELD OF THE INVENTION

The present invention relates to the field of personal identification and verification, and, more particularly, to the field of fingerprint sensing and processing.

BACKGROUND OF THE INVENTION

Fingerprint sensing and matching is a reliable and widely used technique for personal identification or verification. In particular, a common approach to fingerprint identification involves scanning a sample fingerprint or an image thereof and storing the image and/or unique characteristics of the fingerprint image. The characteristics of a sample fingerprint may be compared to information for reference fingerprints already in a database to determine proper identification of a person, such as for verification purposes.

A typical electronic fingerprint sensor is based upon illuminating the finger surface using visible light, infrared light, or ultrasonic radiation. The reflected energy is captured with some form of camera, for example, and the resulting image is framed, digitized and stored as a static digital image. U.S. Pat. No. 4,525,859 to Bowles similarly discloses a video camera for capturing a fingerprint image and uses the minutiae of the fingerprints, that is, the branches and endings of the fingerprint ridges, to determine a match with a database of reference fingerprints.

Unfortunately, optical sensing may be affected by stained fingers or an optical sensor may be deceived by presentation of a photograph or printed image of a fingerprint rather than a true live fingerprint. In addition, optical schemes may require relatively large spacings between the finger contact surface and associated imaging components. Moreover, such sensors typically require precise alignment and complex scanning of optical beams. Accordingly, optical sensors may thus be bulky and be susceptible to shock, vibration and surface contamination. Accordingly, an optical fingerprint sensor may be unreliable in service in addition to being bulky and relatively expensive due to optics and moving parts.

U.S. Pat. No. 4,353,056 to Tsikos discloses another approach to sensing a live fingerprint. In particular, the patent discloses an array of extremely small capacitors located in a plane parallel to the sensing surface of the device. When a finger touches the sensing surface and deforms the surface, a voltage distribution in a series connection of the capacitors may change. The voltages on each of the capacitors is determined by multiplexor techniques. Unfortunately, the resilient materials required for the sensor may suffer from long term reliability problems. In addition, multiplexing techniques for driving and scanning each of the individual capacitors may be relatively slow and cumbersome. Moreover, noise and stray capacitances may adversely affect the plurality of relatively small and closely spaced capacitors.

As mentioned briefly above, fingerprint sensing may have many applications. For example, U.S. Pat. No. 5,623,552 to Lane discloses a self-authenticating card including a live fingerprint sensor and which confirms the identity of the person upon matching of the sensed live fingerprint with a stored fingerprint. U.S. Pat. No. 4,993,068 to Piosenka et al. discloses a personal identification system also matching credentials stored on a portable memory devices, such as a card, to a physical characteristic, such as a live fingerprint. Matching may determine access to a remote site, for example.

U.S. Pat. No. 5,467,403 to Fishbine et al. discloses a portable optical fingerprint scanner which can record fingerprint images in the field and transmit the images to a mobile unit for processing and subsequent wireless transmission to a central location, for providing immediate identity and background checks on the individuals being fingerprinted. The image may be previewed on a screen carried by the housing of the portable scanner.

Also relating to access control, U.S. Pat. No. 4,210,899 to Swonger et al. discloses an optical fingerprint sensor connected in communication with a central control computer for granting access to particular persons and according to particular schedules. Particular access control applications are listed as for: computer centers, radioactive or biological danger areas, controlled experiments, information storage areas, airport maintenance and freight areas, hospital closed areas and drug storage areas, apartment houses and office buildings after hours, safe deposit boxes and vaults, and computer terminal entry and access to information.

U.S. Pat. No. 5,245,329 to Gokcebay discloses an access control system, such as for the doors of secured areas, wherein a mechanical key includes encoded data stored thereon, such as fingerprint information. A fingerprint sensor is positioned at the access point and access is granted if the live fingerprint matches the encoded fingerprint data from the key.

Unfortunately, conventional access control systems based on fingerprint technology use an optical sensor with its attendant drawbacks and disadvantages. In addition, a user typically must be inconvenienced to swipe a card through a reader. A conventional access control system based on fingerprint technology also typically requires that the user experience the further inconvenience of stopping for an additional fingerprint sensing before access is granted.

SUMMARY OF THE INVENTION

In view of the foregoing background, it is therefore an object of the present invention to provide an access control system and associated methods for reliably controlling access in a secure and unobtrusive manner.

This and other objects, features and advantages in accordance with the present invention are provided by an access control system comprising: fingerprint enrolling means for sensing a fingerprint of a person and enrolling the person as an authorized person; an access triggering device to be carried by the authorized person; and access control means for granting access to an authorized person bearing the access triggering device based upon the person approaching the access location.

The access triggering device preferably comprises data storing means, cooperating with the enrolling means, for storing authorization data for an authorized person. The access triggering device also preferably includes wireless transmitter means for transmitting an authorization signal related to the stored authorization data. In addition, the access control means preferably includes wireless receiver means for receiving the authorization signal and granting access responsive to the wireless transmitter means being in proximity to the wireless receiver means.

The authorized person bearing the access trigger device may unobtrusively be granted access merely by approaching the access location. The access triggering device will communicate with the access control means and grant access as long as the device bearer is sufficiently close to the access location. In other words, the authorized person need not go through the inconvenience of locating and manipulating a

card for swiping through a card reader, for example. In addition, the person preferably need not stop for another fingerprinting step at the access location. Moreover, a high degree of security is provided since the person is originally enrolled based upon the positive identification afforded by fingerprint sensing.

In one particularly, advantageous embodiment, the wireless transmitter means comprises a passive transponder. Thus, the wireless receiver means preferably comprises transponder powering means for powering the passive transponder when positioned in proximity thereto. The transponder and powering circuit therefore may be configured so that powering and authorizing signal transmission occurs only as the authorized person is within a predetermined distance of the access control means at the access location. The data storing means and passive transponder may be readily miniaturized to fit on or within a card to be carried in a pocket or wallet, or carried as a badge, for example.

Another aspect of the invention is the provision of record generating means at the access control means for causing generation of a record of granting access to the authorized person. The data storing means of the access triggering device may also include identity storing means for storing authorization data relating to the identity of the authorized person. Accordingly, a record of the person's identity may be made along with the record of granting access.

The access control system may include an access door. The access control means will then further comprise door control means for controlling the access door, such as for controlling locking or automatic opening of the door.

The fingerprint sensor of the enrollment means is preferably reliable, rugged, low cost and compact. Accordingly, another aspect of the invention is that the fingerprint sensor is preferably an integrated circuit fingerprint sensor. The integrated circuit fingerprint sensor preferably comprises a substrate, and at least one electrically conductive layer positioned adjacent the substrate and comprising portions defining an array of electric field sensing electrodes. The at least one electrically conductive layer may further include portions defining a respective shield electrode for each electric field sensing electrode.

A method aspect of the present invention is for access control at an access location. The method preferably comprises the steps of: sensing a fingerprint of a person and enrolling the person as an authorized person based upon the sensed fingerprint; storing authorization data for an authorized person in an access triggering device to be carried by the authorized person; transmitting an authorization signal related to the stored authorization data; and receiving the authorization signal and granting access to an authorized person bearing the access triggering device based upon the access triggering device being in proximity to the access location. As mentioned above, the access triggering device may comprise a passive transponder. Accordingly, the method may preferably further comprise the step of powering the passive transponder when positioned within a predetermined distance of the access location.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view of a fingerprint sensor in accordance with the present invention.

FIG. 2 is a schematic view of a circuit portion of the fingerprint sensor as shown in FIG. 1.

FIG. 3 is a greatly enlarged top plan view of the sensing portion of the fingerprint sensor as shown in FIG. 1.

FIG. 4 is a schematic diagram of another circuit portion of the fingerprint sensor as shown in FIG. 1.

FIG. 5 is a greatly enlarged side cross-sectional view of a portion of the fingerprint sensor as shown in FIG. 1.

FIG. 6 is a greatly enlarged side cross-sectional view of a portion of an alternate embodiment of the fingerprint sensor in accordance with the invention.

FIG. 7 is a greatly enlarged side cross-sectional view of another portion of the fingerprint sensor as shown in FIG. 1.

FIG. 8 is a schematic block diagram of yet another circuit portion of the fingerprint sensor as shown in FIG. 1.

FIG. 9 is a schematic circuit diagram of a portion of the circuit as shown in FIG. 8.

FIG. 10 is a schematic block diagram of still another circuit portion of the fingerprint sensor as shown in FIG. 1.

FIG. 11 is a schematic block diagram of an alternate embodiment of the circuit portion shown in FIG. 10.

FIG. 12 is a schematic block diagram of an additional circuit portion of the fingerprint sensor as shown in FIG. 1.

FIG. 13 is a schematic block diagram of an alternate embodiment of the circuit portion shown in FIG. 12.

FIG. 14 is a schematic diagram of an application of the fingerprint sensor for access control in accordance with the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout. The scaling of various features, particularly layers in the drawing figures, have been exaggerated for clarity of explanation.

Referring to FIGS. 1-3, the fingerprint sensor 30 in accordance with the invention is initially described. The illustrated sensor 30 includes a housing or package 51, a dielectric layer 52 exposed on an upper surface of the package which provides a placement surface for the finger, and a plurality of output pins, not shown. A first conductive strip or external electrode 54 around the periphery of the dielectric layer 52, and a second external electrode 53 provide contact electrodes for the finger 79 as described in greater detail below. The sensor 30 may provide output signals in a range of sophistication levels depending on the level of processing incorporated in the package as would be readily understood by those skilled in the art.

The sensor 30 includes a plurality of individual pixels or sensing elements 30a arranged in array pattern as perhaps best shown in FIG. 3. As would be readily understood by those skilled in the art, these sensing elements are relatively small so as to be capable of sensing the ridges 59 and intervening valleys 60 of a typical fingerprint. As will also be readily appreciated by those skilled in the art, live fingerprint readings as from the electric field sensor 30 in accordance with the present invention may be more reliable than optical sensing, because the impedance of the skin of a finger in a pattern of ridges and valleys is extremely difficult to simulate. In contrast, an optical sensor may be deceived by a readily deceived by a photograph or other similar image of a fingerprint, for example.

The sensor 30 includes a substrate 65, and one or more active semiconductor devices formed thereon, such as the

schematically illustrated amplifier 73. A first metal layer 66 interconnects the active semiconductor devices. A second or ground plane electrode layer 68 is above the first metal layer 66 and separated therefrom by an insulating layer 67. A third metal layer 71 is positioned over another dielectric layer 70. In the illustrated embodiment, the first external electrode 54 is connected to an excitation drive amplifier 74 which, in turn, drives the finger 79 with a signal may be typically in the range of about 1 KHz to 1 MHz. Accordingly, the drive or excitation electronics are thus relatively uncomplicated and the overall cost of the sensor 30 may be relatively low, while the reliability is great.

An illustratively circularly shaped electric field sensing electrode 73 is on the insulating layer 70. The sensing electrode 78 may be connected to sensing integrated electronics, such as the illustrated amplifier 73 formed adjacent the substrate 65 as schematically illustrated, and as would be readily appreciated by those skilled in the art.

An annularly shaped shield electrode 80 surrounds the sensing electrode 78 in spaced relation therefrom. As would be readily appreciated by those skilled in the art, the sensing electrode 78 and its surrounding shield electrode 80 may have other shapes, such as hexagonal, for example, to facilitate a close packed arrangement or array of pixels or sensing elements 30a. The shield electrode 80 is an active shield which is driven by a portion of the output of the amplifier 73 to help focus the electric field energy and, moreover, to thereby reduce the need to drive adjacent electric field sensing electrodes 78.

The sensor 30 includes only three metal or electrically conductive layers 66, 68 and 71. The sensor 30 can be made without requiring additional metal layers which would otherwise increase the manufacturing cost, and, perhaps, reduce yields. Accordingly, the sensor 30 is less expensive and may be more rugged and reliable than a sensor including four or more metal layers as would be appreciated by those skilled in the art.

Another important aspect of the present invention is that the amplifier 73 may be operated at a gain of greater than about one to drive the shield electrode 80. Stability problems do not adversely affect the operation of the amplifier 73. Moreover, the common mode and general noise rejection are greatly enhanced according to this feature of the invention. In addition, the gain greater than one tends to focus the electric field with respect to the sensing electrode 78 as will be readily appreciated by those skilled in the art.

In general, the sensing elements 30a operate at very low currents and at very high impedances. For example, the output signal from each sensing electrode 78 is desirably about 5 to 10 millivolts to reduce the effects of noise and permit further processing of the signals. The approximate diameter of each sensing element 30a, as defined by the outer dimensions of the shield electrode 80, may be about 0.002 to 0.005 inches in diameter. The ground plane electrode 68 protects the active electronic devices from unwanted excitation. The various signal feedthrough conductors for the electrodes 78, 80 to the active electronic circuitry may be readily formed as would be understood by those skilled in the art.

The overall contact or sensing surface for the sensor 30 may desirably be about 0.5 by 0.5 inches—a size which may be readily manufactured and still provide a sufficiently large surface for accurate fingerprint sensing and identification. The sensor 30 in accordance with the invention is also fairly tolerant of dead pixels or sensing elements 30a. A typical sensor 30 includes an array of about 256 by 256 pixels or

sensor elements, although other array sizes are also contemplated by the present invention. The sensor 30 may also be fabricated at one time using primarily conventional semiconductor manufacturing techniques to thereby significantly reduce the manufacturing costs.

Turning now additionally to FIG. 4, another aspect of the sensor 30 of the invention is described. The sensor may include power control means for controlling operation of active circuit portions 100 based upon sensing finger contact with the first external electrode 54 as determined by the illustrated finger sense block or circuit 101. For example, the finger sense circuit 101 may operate based upon a change in impedance to an oscillator to thereby determine finger contact. Of course, other approaches for sensing contact with the finger are also contemplated by the invention. The power control means may include wake-up means for only powering active circuit portions upon sensing finger contact with the first external electrode to thereby conserve power. Alternately or additionally, the power control means may further comprise protection means for grounding active circuit portions upon not sensing finger contact with the first external electrode. In the illustrated embodiment, a combination of wake-up and protection controller circuits 101 are illustrated.

Moreover, the fingerprint sensor 30 may further comprise finger charge bleed means for bleeding a charge from a finger or other object upon contact therewith. The finger charge bleed means may be provided by the second external electrode 53 carried by the package 51 for contact by a finger, and a charge bleed resistor 104 connected between the second external electrode and an earth ground. As schematically illustrated in the upper right hand portion of FIG. 4, the second electrode may alternately be provided by a movable electrically conductive cover 53' slidably connected to the package 51 for covering the opening to the exposed upper dielectric layer 52. A pivotally connected cover is also contemplated by the present invention. Accordingly, under normal conditions, the charge would be bled from the finger as the cover 53' is moved to expose the sensing portion of the sensor 30.

In addition, the finger charge bleed means and power control means may be such that the active portions remain grounded until the charge bleed means can remove the charge on the finger before powering the active circuit portions, such as by providing a brief delay during wake-up sufficient to permit the charge to be discharged through the resistor 104 as would be readily understood by those skilled in the art. Accordingly, power may be conserved in the sensor 30 and ESD protection provided by the sensor so that the sensor is relatively inexpensive, yet robust and conserves power.

Referring now additionally to FIG. 5 yet another significant feature of the sensor 30 is described. The dielectric covering 52 may preferably comprise a z-axis anisotropic dielectric layer 110 for focussing an electric field, shown by the illustrated field lines, at each of the electric field sensing electrodes 78. In other words, the dielectric layer 110 may be relatively thick, but not result in defocussing of the electric fields propagating therethrough because of the z-axis anisotropy of the material. Typically there would be a trade-off between field focus and mechanical protection. Unfortunately, a thin film which is desirable for focussing, may permit the underlying circuit to be more easily subject to damage.

The z-axis anisotropic dielectric layer 110 of the present invention, for example, may have a thickness in range of

about 0.0001 to 0.004 inches. Of course, the z-axis anisotropic dielectric layer **110** is also preferably chemically resistant and mechanically strong to withstand contact with fingers, and to permit periodic cleanings with solvents. The z-axis anisotropic dielectric layer **110** may preferably define an outermost protective surface for the integrated circuit die **120**. Accordingly, the overall dielectric covering **52** may further include at least one relatively thin oxide, nitride, carbide, or diamond layer **111** on the integrated circuit die **120** and beneath the z-axis anisotropic dielectric layer **110**. The thin layer **111** will typically be relatively hard, and the z-axis anisotropic dielectric layer **110** is desirably softer to thereby absorb more mechanical activity.

The z-axis anisotropic dielectric layer **110** may be provided by a plurality of oriented dielectric particles in a cured matrix. For example, the z-axis anisotropic dielectric layer **110** may comprise barium titanate in a polyimide matrix. Those of skill in the art will appreciate other materials exhibiting z-axis anisotropy suitable for the present invention. For example, certain ceramics exhibit dielectric anisotropy as would also be appreciated by those skilled in the art.

Turning to FIG. 6, another variation of a z-axis dielectric covering **52'** is schematically shown by a plurality of high dielectric portions **112** aligned with corresponding electric field sensing electrodes **78**, and a surrounding matrix of lower dielectric portions **113**. This embodiment of the dielectric covering **52'** may be formed in a number of ways, such as by forming a layer of either the high dielectric or low dielectric portions, selectively etching same, and filling the openings with the opposite material. Another approach may be to use polarizable microcapsules and subjecting same to an electric field during curing of a matrix material. A material may be compressed to cause the z-axis anisotropy. Laser and other selective processing techniques may also be used as would be readily understood by those skilled in the art.

Another aspect of the invention relates to being able to completely cover and protect the entire upper surface of the integrated circuit die **120**, and still permit connection and communication with the external devices and circuits as now further explained with reference to FIG. 7. The third metal layer **71** (FIG. 2) preferably further includes a plurality of capacitive coupling pads **116a-118a** for permitting capacitive coupling of the integrated circuit die **120**. Accordingly, the dielectric covering **52** is preferably continuous over the capacitive coupling pads **116a-118a** and the array of electric field sensing electrodes **78** of the pixels **30a** (FIG. 1). In sharp contrast to this feature of the present invention, it is conventional to create openings through an outer coating to electrically connect to the bond pads. Unfortunately, these openings would provide pathways for water and/or other contaminants to come in contact with and damage the die.

A portion of the package **51** includes a printed circuit board **122** which carries corresponding pads **115b-118b**. A power modulation circuit **124** is coupled to pads **115b-116b**, while a signal modulation circuit **126** is illustrative coupled to pads **117b-118b**. As would be readily understood by those skilled in the art, both power and signals may be readily coupled between the printed circuit board **122** and the integrated circuit die **120**, further using the illustrated power demodulation/regulator circuit **127**, and the signal demodulation circuit **128**. The z-axis anisotropic dielectric layer **110** also advantageously reduces cross-talk between adjacent capacitive coupling pads. This embodiment of the invention **30** presents no penetrations through the dielectric covering **52** for moisture to enter and damage the integrated circuit die **120**. In addition, another level of insulation is provided between the integrated circuit and the external environment.

For the illustrated fingerprint sensor **30**, the package **51** preferably has an opening aligned with the array of electric field sensing electrodes **78** (FIGS. 1-3). The capacitive coupling and z-axis anisotropic layer **110** may be advantageously used in a number of applications in addition to the illustrated fingerprint sensor **30**, and particularly where it is desired to have a continuous film covering the upper surface of the integrated circuit die **120** and pads **116a-118a**.

Further aspects of the manufacturing of the sensor **30** including the z-axis anisotropic dielectric material are explained in U.S. patent application, Ser. No. 08/857,525, filed May 16, 1997, entitled "Direct Chip Attachment Method and Devices Produced Thereby". This patent application has attorney work docket no. 18763, is assigned to the present assignee, and the entire disclosure of which is incorporated herein by reference.

Referring additionally to FIGS. 8 and 9, impedance matrix filtering aspects of the invention are now described. As shown in FIG. 8, the fingerprint sensor **30** may be considered as comprising an array of fingerprint sensing elements **130** and associated active circuits **131** for generating signals relating to the fingerprint image. The illustrated sensor **30** also includes an impedance matrix **135** connected to the active circuits for filtering the signals therefrom.

As shown with more particular reference to FIG. 9, the impedance matrix **135** includes a plurality of impedance elements **136** with a respective impedance element connectable between each active circuit of a respective fingerprint sensing element as indicated by the central node **138**, and the other active circuits (outer nodes **140**). The impedance matrix **135** also includes a plurality of switches **137** with a respective switch connected in series with each impedance element **136**. An input signal may be supplied to the central node **138** via the illustrated switch **142** and its associated impedance element **143**. The impedance element may be one or more of a resistor as illustrated, and a capacitor **134** as would be readily appreciated by those skilled in the art.

Filter control means may operate the switches **137** to perform processing of the signals generated by the active circuits **131**. In one embodiment, the fingerprint sensing elements **130** may be electric field sensing electrodes **78**, and the active circuits **131** may be amplifiers **73** (FIG. 2). Of course other sensing elements and active circuits may also benefit from the impedance matrix filtering of the present invention as would be readily understood by those skilled in the art.

Ridge flow determining means **145** may be provided for selectively operating the switches **137** of the matrix **135** to determine ridge flow directions of the fingerprint image. More particularly, the ridge flow determining means **145** may selectively operate the switches **137** for determining signal strength vectors relating to ridge flow directions of the fingerprint image. As would be readily understood by those skilled in the art, the ridge flow directions may be determined based upon well known rotating slit principles.

The sensor **30** may include core location determining means **146** cooperating with the ridge flow determining means **145** for determining a core location of the fingerprint image. The position of the core is helpful, for example, in extracting and processing minutiae from the fingerprint image as would also be readily understood by those skilled in the art.

As also schematically illustrated in FIG. 8, a binarizing filter **150** may be provided for selectively operating the switches **137** to convert a gray scale fingerprint image to a binarized fingerprint image. Considered another way, the

impedance matrix **135** may be used to provide dynamic image contrast enhancement. In addition, an edge smoothing filter **155** may be readily implemented to improve the image. As also schematically illustrated other spatial filters **152** may also be implemented using the impedance matrix **135** for selectively operating the switches **137** to spatially filter the fingerprint image as would be readily appreciated by those of skill in the art. Accordingly, processing of the fingerprint image may be carried out at the sensor **30** and thereby reduce additional downstream computational requirements.

As shown in the illustrated embodiment of FIG. 9, the impedance matrix **135** may comprise a plurality of impedance elements with a respective impedance element **136** connectable between each active circuit for a given fingerprint sensing element **130** and eight other active circuits for respective adjacent fingerprint sensing elements.

Yet another aspect of the invention is the provision of control means **153** for sequentially powering sets of active circuits **131** to thereby conserve power. Of course, the respective impedance elements **136** are desirably also sequentially connected to perform the filtering function. The powered active circuits **131** may be considered as defining a cloud or kernel as would be readily appreciated by those skilled in the art. The power control means **153** may be operated in an adaptive fashion whereby the size of the area used for filtering is dynamically changed for preferred image characteristics as would also be readily understood by those skilled in the art. In addition, the power control means **153** may also power only certain ones of the active circuits corresponding to a predetermined area of the array of sensing elements **130**. For example, every other active circuit **131** could be powered to thereby provide a larger area, but reduced power consumption as would also be understood by those skilled in the art.

Reader control means **154** may be provided to read only predetermined subsets of each set of active circuits **131** so that a contribution from adjacent active circuits is used for filtering. In other words, only a subset of active circuits **131** are typically simultaneously read although adjacent active circuits **131** and associated impedance elements **136** are also powered and connected, respectively. For example, 16 impedance elements **136** could define a subset and be readily simultaneously read. The subset size could be optimized for different sized features to be determined as would be readily appreciated by those skilled in the art.

Accordingly, the array of sense elements **130** can be quickly read, and power consumption substantially reduced since all of the active circuits **131** need not be powered for reading a given set of active circuits. For a typical sensor, the combination of the power control and impedance matrix features described herein may permit power savings by a factor of about 10 as compared to powering the full array.

It is another important advantage of the fingerprint sensor **30** according to present invention to guard against spoofing or deception of the sensor into incorrectly treating a simulated image as a live fingerprint image. For example, optical sensors may be deceived or spoofed by using a paper with a fingerprint image thereon. The unique electric field sensing of the fingerprint sensor **30** of the present invention provides an effective approach to avoiding spoofing based upon the complex impedance of a finger.

As shown in FIG. 10, the fingerprint sensor **30** may be considered as including an array of impedance sensing elements **160** for generating signals related to a finger **79** or other object positioned adjacent thereto. In the embodiment described herein, the impedance sensing elements **160** are

provided by electric field sensing electrodes **78** and amplifiers **73** (FIG. 2) associated therewith. In addition, a guard shield **80** may be associated with each electric field sensing electrode **78** and connected to a respective amplifier **73**. Spoof reducing means **161** is provided for determining whether or not an impedance of the object positioned adjacent the array of impedance sensing elements **160** corresponds to a live finger **79** to thereby reduce spoofing of the fingerprint sensor by an object other than a live finger. A spoofing may be indicated, such as by the schematically illustrated lamp **163** and/or used to block further processing. Alternately, a live fingerprint determination may also be indicated by a lamp **164** and/or used to permit further processing of the fingerprint image as will be readily appreciated by those skilled in the art. Many other options for indicating a live fingerprint or an attempted spoofing will be readily appreciated by those skilled in the art.

In one embodiment, the spoof reducing means **161** may include impedance determining means **165** to detect a complex impedance having a phase angle in a range of about 10 to 60 degrees corresponding to a live finger **79**. Alternately, the spoof reducing means **161** may detect an impedance having a phase angle of about 0 degrees corresponding to some objects other than a live finger, such as a sheet of paper having an image thereon, for example. In addition, the spoof reducing means **161** may detect an impedance of 90 degrees corresponding to other objects.

Turning now to FIG. 11, another embodiment of spoof reducing means is explained. The fingerprint sensor **30** may preferably include drive means for driving the array of impedance sensing elements **160**, such as the illustrated excitation amplifier **74** (FIG. 2). The sensor also includes synchronous demodulator means **170** for synchronously demodulating signals from the array of impedance sensing elements **160**. Accordingly, in one particularly advantageous embodiment of the invention, the spoof reducing means comprises means for operating the synchronous demodulator means **170** at at least one predetermined phase rotation angle. For example, the synchronous demodulator means **170** could be operated in a range of about 10 to 60 degrees, and the magnitude compared to a predetermined threshold indicative of a live fingerprint. A live fingerprint typically has a complex impedance within the range of 10 to 60 degrees.

Alternately, ratio generating and comparing means **172** may be provided for cooperating with the synchronous demodulator means **170** for synchronously demodulating signals at first and second phase angles θ_1 , θ_2 , generating an amplitude ratio thereof, and comparing the amplitude ratio to a predetermined threshold to determine whether the object is a live fingerprint or other object. Accordingly, the synchronous demodulator **170** may be readily used to generate the impedance information desired for reducing spoofing of the sensor **30** by an object other than a live finger. The first angle θ_1 and the second θ_2 may have a difference in a range of about 45 to 90 degrees, for example. Other angles are also contemplated by the invention as would be readily appreciated by those skilled in the art.

The fingerprint sensor **30** also includes an automatic gain control feature to account for a difference in intensity of the image signals generated by different fingers or under different conditions, and also to account for differences in sensor caused by process variations. It is important for accurately producing a fingerprint image, that the sensor can discriminate between the ridges and valleys of the fingerprint. Accordingly, the sensor **30** includes a gain control feature, a first embodiment of which is understood with reference to FIG. 12.

As shown in FIG. 12, the illustrated portion of the fingerprint sensor 30 includes an array of fingerprint sensing elements in the form of the electric field sensing electrodes 78 and surrounding shield electrodes 80 connected to the amplifiers 73. Other fingerprint sensing elements may also benefit from the following automatic gain control implementations as will be appreciated by those skilled in the art.

The signal processing circuitry of the sensor 30 preferably includes a plurality of analog-to-digital (A/D) converters 180 as illustrated. Moreover, each of these A/D converters 180 may have a controllable scale. Scanning means 182 sequentially connects different elements to the bank of A/D converters 180. The illustrated gain processor 185 provides range determining and setting means for controlling the range of the A/D converters 180 based upon prior A/D conversions to thereby provide enhanced conversion resolution. The A/D converters 180 may comprise the illustrated reference voltage input V_{ref} and offset voltage input V_{offset} for permitting setting of the range as would be readily appreciated by those skilled in the art. Accordingly, the range determining and setting means may also comprise a first digital-to-analog D/A converter 186 connected between the gain processor 185 and the reference voltage V_{ref} inputs of the A/D converters 180 as would also be readily understood by those skilled in the art. In addition, a second D/A converter 189 is also illustratively connected to the offset voltage inputs V_{offset} from the gain processor 185.

The gain processor 185 may comprise histogram generating means for generating a histogram, as described above, and based upon prior A/D conversions. The graph adjacent the gain processor 185 in FIG. 12 illustrates a typical histogram plot 191. The histogram plot 191 includes two peaks corresponding to the sensed ridges and valleys of the fingerprint as would be readily appreciated by those skilled in the art. By setting the range for the A/D converters 180, the peaks can be readily positioned as desired to thereby account for the variations discussed above and use the full resolution of the A/D converters 180.

Turning additionally to FIG. 13, the A/D converters 180 may include an associated input amplifier for permitting setting of the range. In this variation, the range determining and setting means may also comprise the illustrated gain processor 185, and wherein the amplifier is a programmable gain amplifier (PGA) 187 connected to the processor. A digital word output from the gain processor 185 sets the gain of the PGA 187 so that full use of the resolution of the A/D converters 180 is obtained for best accuracy. A second digital word output from the gain processor 185 and coupled to the amplifier 187 through the illustrated D/A converter 192 may also control the offset of the amplifier as would also be readily appreciated by those skilled in the art.

The range determining and setting means of the gain processor 185 may comprise default setting means for setting a default range for initial ones of the fingerprint sensing elements. The automatic gain control feature of the present invention allows the D/A converters 180 to operate over their full resolution range to thereby increase the accuracy of the image signal processing.

Turning now to FIG. 14 an advantageous application of the fingerprint sensor 30 to an access control system 195 is now described. The access control system 195 includes the illustrated fingerprint enrolling station 200 for sensing a fingerprint of a person and enrolling the person as an authorized person based upon the sensed fingerprint. As will be readily appreciated by those skilled in the art, a fingerprint is a highly accurate indicator of a person's identity.

Moreover, as described extensively herein, the integrated circuit fingerprint sensor 30 includes a number of desirable features including reliability, low cost, low power consumption, and spoof reducing features.

The enrolling station 200 includes the illustrated personal computer 201 and a badge programming device 202. The badge programming device 202 includes the fingerprint sensor 30 mounted on an upper surface of the device housing 203. The device 202 also includes a slot for accepting a planar access triggering device, such as the illustrated access badge 207. The badge programming device 202 loads data onto a memory storage portion of the badge 207 as described in greater detail below and as would be readily understood by those skilled in the art.

An access controller 210 is provided at the access location 230 for granting access to an authorized person 225 bearing the access triggering device or access badge 207. The access triggering device may be in many other card-like forms, such as a card adapted to be carried in a pocket or wallet, for example. Those of skill in the art will recognize other similar configurations of an access triggering device that are also relatively compact and easy to carry.

In the central portion of FIG. 14, the access location 230 is at a door 212. As mention briefly above, the access badge 207 preferably includes data storing means 227, cooperating with the enrolling station 200, for storing authorization data for an authorized person. The data storing means 227 stores data for a person who has been enrolled into the system 195 as an authorized person. The data storing means 227 may be provided by any of a number of conventional memory or data storage devices as will be readily appreciated by those skilled in the art.

As shown in the lower schematic block diagram portion of FIG. 14, the access badge 207 also preferably includes a wireless transmitter 220 for transmitting an authorization signal related to the stored authorization data. The stored authorization signal data may be an authorizing code, or may be data based on the sensed fingerprint, for example. In addition, the access controller 210 preferably includes a wireless receiver 222 and its associated antenna 224 for receiving the authorization signal. The wireless receiver 222 cooperates with the illustrated processor 223 for granting access responsive to the access card 207, including the wireless transmitter 220 and its associated antenna 218, being in proximity to the wireless receiver 222.

The authorized person 225 bearing the access card 207 may unobtrusively be granted access merely by approaching the access location. The access triggering device or badge 207 will communicate with the access controller 210 and grant access as long as the device bearer is sufficiently close to the access location 230. In other words, the authorized person 225 need not go through the inconvenience of manipulating a card in contact with a card reader, for example. In addition, the person 225 need not be subject to another fingerprinting step at the access location 230. Moreover, a high degree of security is provided since the person 225 is originally enrolled based upon the positive identification afforded by fingerprint sensing.

In one particularly, advantageous embodiment, the access badge 207 includes a passive transponder 242. By passive transponder 242 is meant that the badge 207 has no onboard battery, but rather that the transmitter 220, and other associated electronics are temporarily powered by the illustrated power capture means 232 and its associated antenna 233. Thus, the access controller 210 preferably comprises transponder powering or radiating means 240 and its associated

antenna **241** for powering the passive transponder **242** when positioned in proximity thereto.

The operation of a passive transponder **242** and power radiating means **240** will be readily appreciated by those skilled in the art without further discussion. Moreover, the transponder **242** and power radiator **240**, for example, may be configured so that powering and transmission occurs only as the authorized person **225** is within a predetermined distance of the access controller **210** at the access location **230**. As would also be readily understood by those skilled in the art, the data storing means **227**, processor **243**, and passive transponder **242** may be readily miniaturized to fit on or within a card or other substrate so as to be readily carried in a pocket or wallet, for example, in addition to the illustrated badge **207**.

Another aspect of the invention is the provision of record generating means **245** for causing generation of a record of granting access to the authorized person. For example, the record may be generated at the access controller **210** and later downloaded to a central computer, such as the illustrated personal computer **201** of the enrolling station **200**. In another variation, the record generating means **245** may communicate with the personal computer **201** to cause the computer to generate and maintain the record.

As shown in the illustrated embodiment, the access controller **210** may be connected to the illustrated enrolling station **200**, so that the enrolling station serves a central control computer. The central control computer may have many uses including the control of access levels for different classes of authorized persons, and for controlling access based on time of day, for example. Other main or central control configurations are also contemplated by the invention and will be readily appreciated by those skilled in the art. In addition to the schematically illustrated wireline connection **252** between the personal computer **201** and the access controllers **210**, these communication links may also be wireless, using equipment typically used for wireless local area networks, as would be readily understood by those skilled in the art.

The data storing means **227** of the access badge **207** may also include identity storing means for storing authorization data relating to the identity of the authorized person. Accordingly, a record of the person's identity may be made along with the record of granting access as will be readily appreciated by those skilled in the art.

The access control system **195** may include an access door **212**. The access controller **210** also illustratively includes door control means **247** for controlling opening or locking of the access door. The door control means **247** will typically interface with an actuator, such as for opening the door **212**, or a powered door strike for unlocking the door as will also be readily appreciated by those skilled in the art.

A method aspect of the present invention is for access control at an access location **230**. The method preferably comprises the steps of: sensing a fingerprint of a person and enrolling the person as an authorized person **225** based upon the sensed fingerprint; storing authorization data for an authorized person in an access triggering device **207** to be carried by the authorized person; transmitting an authorization signal related to the stored authorization data; and receiving the authorization signal and granting access to an authorized person bearing the access triggering device based upon the access triggering device being in proximity to the access location **230**. As mentioned above, the access triggering device may comprise a passive transponder **218**. Accordingly, the method may preferably further comprise

the step of powering the passive transponder **242** when positioned in proximity to the access location.

Other aspects, advantages, and features relating to sensing of fingerprints are disclosed in copending U.S. patent application Ser. No. 08/592,469 entitled "Electric Field Fingerprint Sensor and Related Methods", and U.S. patent application Ser. No. 08/671,430 entitled "Integrated Circuit Device Having an Opening Exposing the Integrated Circuit Die and Related Methods", both assigned to the assignee of the present invention, and the entire disclosures of which are incorporated herein by reference. In addition, many modifications and other embodiments of the invention will come to the mind of one skilled in the art having the benefit of the teachings presented in the foregoing descriptions and the associated drawings. Therefore, it is to be understood that the invention is not to be limited to the specific embodiments disclosed, and that modifications and embodiments are intended to be included within the scope of the appended claims.

That which is claimed is:

1. An access control system comprising:

fingerprint enrolling means for sensing a fingerprint of a person and enrolling the person as an authorized person based upon the sensed fingerprint;

access control means for granting access to the authorized person; and

a passive access triggering device to be carried by the authorized person, said passive access triggering device comprising

data storing means, cooperating with said fingerprint enrolling means, for storing authorization data for the authorized person, and

wireless transmitter means comprising a passive transponder for transmitting an authorization signal related to the stored authorization data responsive to said passive access triggering device being positioned in proximity to said access control means;

said access control means comprising

passive transponder powering means for powering said passive transponder when positioned in proximity thereto, and

wireless receiver means for receiving the authorization signal from said passive access triggering device.

2. An access control system according to claim 1 wherein said access control means further comprises record generating means for causing generation of a record of granting access to the authorized person.

3. An access control system according to claim 2 wherein said data storing means comprises identity storing means for storing authorization data relating to the identity of the authorized person.

4. An access control system according to claim 3 wherein said record generating means comprises means for causing generation of the record further including data relating to the identity of the authorized person granted access.

5. An access control system according to claim 1 wherein said passive access triggering device comprises a card to be carried by the authorized person.

6. An access control system according to claim 1 further comprising an access door; and wherein said access control means further comprises door control means for controlling opening of said access door.

7. An access control system according to claim 6 wherein said access door control means further comprises unlocking means for unlocking said access door.

8. An access control system according to claim 6 wherein said access door control means further comprises door opening means for opening the access door.

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9. An access control system according to claim 1 wherein said fingerprint sensor is an integrated circuit fingerprint sensor.

10. An access control system according to claim 9 wherein said integrated circuit fingerprint sensor comprises:
a substrate; and
at least one electrically conductive layer positioned adjacent said substrate and comprising portions defining an array of electric field sensing electrodes.

11. An access control system according to claim 10 wherein said at least one electrically conductive layer further comprises portions defining a respective shield electrode for each electric field sensing electrode.

12. An access control system comprising:
fingerprint enrolling means for sensing a fingerprint of a person and enrolling the person as an authorized person based upon the sensed fingerprint;

access control means for granting access to the authorized person; and

a passive access triggering device to be carried by the authorized person, said passive access triggering device comprising

data storing means, cooperating with said enrolling means, for storing authorization data for the authorized person, and

wireless passive transponder means for transmitting an authorization signal related to the stored authorization data responsive to said passive access triggering device being positioned in proximity to said access control means;

said access control means for granting access to the authorized person bearing said passive access triggering device and without requiring sensing of a fingerprint of the authorized person bearing said passive access triggering device, said access control means comprising

wireless passive transponder powering means for powering said wireless passive transponder means when positioned in proximity thereto, and

wireless receiver means for receiving the authorization signal from said passive access triggering device.

13. An access control system according to claim 12 wherein said access control means further comprises record generating means for causing generation of a record of granting access to the authorized person.

14. An access control system according to claim 13 wherein said data storing means comprises identity storing means for storing authorization data relating to the identity of the authorized person.

15. An access control system according to claim 14 wherein said record generating means comprises means for causing generation of the record further including data relating to the identity of the authorized person granted access.

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16. An access control system according to claim 12 wherein said passive access triggering device comprises a card to be carried by the authorized person.

17. An access control system according to claim 12 further comprising an access door; and wherein said access control means further comprises door control means for controlling opening of said access door.

18. An access control system according to claim 12 wherein said fingerprint sensor is an integrated circuit fingerprint sensor.

19. An access control system according to claim 18 wherein said integrated circuit fingerprint sensor comprises:
a substrate; and

at least one electrically conductive layer positioned adjacent said substrate and comprising portions defining an array of electric field sensing electrodes.

20. An access control system according to claim 19 wherein said at least one electrically conductive layer further comprises portions defining a respective shield electrode for each electric field sensing electrode.

21. A method for access control at an access location, comprising the steps of:

sensing a fingerprint of a person and enrolling the person as an authorized person based upon the sensed fingerprint;

storing authorization data for the authorized person in a passive access triggering device to be carried by the authorized person, the passive access triggering device comprises a passive transponder;

powering the passive transponder when positioned in proximity to the access location;

transmitting from the passive transponder an authorization signal related to the stored authorization data responsive to the passive transponder being positioned in proximity to the access location; and

receiving the authorization signal and granting access to the authorized person bearing the passive access triggering device based upon receiving the authorization signal from the passive access triggering device.

22. A method according to claim 21 further comprising the step of causing generation of a record of granting access to the authorized person.

23. A method according to claim 21 further comprising the step of causing generation of a record of granting access to the authorized person and including an identity thereof.

24. A method according to claim 21 wherein the step of sensing a fingerprint comprising sensing a fingerprint using an integrated circuit fingerprint sensor.

* * * * *

1 of 32 DOCUMENTS



Caution

As of: Jun 20, 2007

KSR INTERNATIONAL CO., PETITIONER v. TELEFLEX INC. ET AL.

No. 04-1350

SUPREME COURT OF THE UNITED STATES

127 S. Ct. 1727; 167 L. Ed. 2d 705; 2007 U.S. LEXIS 4745; 75 U.S.L.W. 4289; 82
U.S.P.Q.2D (BNA) 1385; 20 Fla. L. Weekly Fed. S 248

November 28, 2006, Argued

April 30, 2007, Decided

NOTICE: [***1] The LEXIS pagination of this document is subject to change pending release of the final published version.

PRIOR HISTORY: ON WRIT OF CERTIORARI TO THE UNITED STATES COURT OF APPEALS FOR THE FEDERAL CIRCUIT. *Teleflex, Inc. v. KSR Int'l Co.*, 119 Fed. Appx. 282, 2005 U.S. App. LEXIS 176 (Fed. Cir., 2005)

DISPOSITION: Reversed and remanded.

Case in Brief (\$)

Expert Commentary (\$)

Donald S. Chisum on the Supreme Court's Latest Word on Obviousness and Combination Inventions

Common sense governs when assessing the patentability of inventions that combine prior art elements. So the Supreme Court holds in KSR. It affirms its prior decisions, which urged caution in granting patents on combinations. It rejects rigid applications of the Federal Circuit's "TSM" (teaching, suggestion, motivation) test, which made challenges to combination patents more difficult. This commentary, written by Donald S. Chisum, author of the renowned treatise *Chisum on Patents* discusses the import and potential extensions of this important decision.

SYLLABUS: To control a conventional automobile's speed, the driver depresses or releases the gas pedal, which interacts with the throttle via a cable or other mechanical link. Because the pedal's position in the footwell

normally cannot be adjusted, a driver wishing to be closer or farther from it must either reposition himself in the seat or move the seat, both of which can be imperfect solutions for smaller drivers in cars with deep footwells. This prompted inventors to design and patent pedals that could be adjusted to change their locations. The Asano patent reveals a support structure whereby, when the pedal location is [***2] adjusted, one of the pedal's pivot points stays fixed. Asano is also designed so that the force necessary to depress the pedal is the same regardless of location adjustments. The Redding patent reveals a different, sliding mechanism where both the pedal and the pivot point are adjusted.

In newer cars, computer-controlled throttles do not operate through force transferred from the pedal by a mechanical link, but open and close valves in response to electronic signals. For the computer to know what is happening with the pedal, an electronic sensor must translate the mechanical operation into digital data. Inventors had obtained a number of patents for such sensors. The so-called '936 patent taught that it was preferable to detect the pedal's position in the pedal mechanism, not in the engine, so the patent disclosed a pedal with an electronic sensor on a pivot point in the pedal assembly. The Smith patent taught that to prevent the wires connecting the sensor to the computer from chafing and wearing out, the sensor should be put on a fixed part of the pedal assembly rather than in or on the pedal's footpad. Inventors had also patented self-contained modular sensors, which can be [***3] taken off the shelf and attached to any mechanical pedal to allow it to function with a computer-controlled throttle. The '068 patent

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disclosed one such sensor. Chevrolet also manufactured trucks using modular sensors attached to the pedal support bracket, adjacent to the pedal and engaged with the pivot shaft about which the pedal rotates. Other patents disclose electronic sensors attached to adjustable pedal assemblies. For example, the Rixon patent locates the sensor in the pedal footpad, but is known for wire chafing.

After petitioner KSR developed an adjustable pedal system for cars with cable-actuated throttles and obtained its '976 patent for the design, General Motors Corporation (GMC) chose KSR to supply adjustable pedal systems for trucks using computer-controlled throttles. To make the '976 pedal compatible with the trucks, KSR added a modular sensor to its design. Respondents (Teleflex) hold the exclusive license for the Engelgau patent, claim 4 of which discloses a position-adjustable pedal assembly with an electronic pedal position sensor attached a fixed pivot point. Despite having denied a similar, broader claim, the U.S. Patent and Trademark Office (PTO) had allowed [***4] claim 4 because it included the limitation of a fixed pivot position, which distinguished the design from Redding's. Asano was neither included among the Engelgau patent's prior art references nor mentioned in the patent's prosecution, and the PTO did not have before it an adjustable pedal with a fixed pivot point. After learning of KSR's design for GMC, Teleflex sued for infringement, asserting that KSR's pedal system infringed the Engelgau patent's claim 4. KSR countered that claim 4 was invalid under § 103 of the Patent Act, which forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art."

Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545, set out an objective analysis for applying § 103: "The scope and content of the prior art are . . . determined; differences between the prior art and the claims at issue are . . . ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness [***5] of the subject matter is determined. Such secondary considerations as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." While the sequence of these questions might be reordered in any particular case, the factors define the controlling inquiry. However, seeking to resolve the obviousness question with more uniformity and consistency, the Federal Circuit has employed a "teaching,

suggestion, or motivation" (TSM) test, under which a patent claim is only proved obvious if the prior art, the problem's nature, or the knowledge of a person having ordinary skill in the art reveals some motivation or suggestion to combine the prior art teachings.

The District Court granted KSR summary judgment. After reviewing pedal design history, the Engelgau patent's scope, and the relevant prior art, the court considered claim 4's validity, applying *Graham's* framework to determine whether under summary-judgment standards KSR had demonstrated that claim 4 was obvious. The court found "little difference" between the prior art's teachings and claim 4: [***6] Asano taught everything contained in the claim except using a sensor to detect the pedal's position and transmit it to a computer controlling the throttle. That additional aspect was revealed in, e.g., the '068 patent and Chevrolet's sensors. The court then held that KSR satisfied the TSM test, reasoning (1) the state of the industry would lead inevitably to combinations of electronic sensors and adjustable pedals, (2) Rixon provided the basis for these developments, and (3) Smith taught a solution to Rixon's chafing problems by positioning the sensor on the pedal's fixed structure, which could lead to the combination of a pedal like Asano with a pedal position sensor.

Reversing, the Federal Circuit ruled the District Court had not applied the TSM test strictly enough, having failed to make findings as to the specific understanding or principle within a skilled artisan's knowledge that would have motivated one with no knowledge of the invention to attach an electronic control to the Asano assembly's support bracket. The Court of Appeals held that the District Court's recourse to the nature of the problem to be solved was insufficient because, unless the prior art references [***7] addressed the precise problem that the patentee was trying to solve, the problem would not motivate an inventor to look at those references. The appeals court found that the Asano pedal was designed to ensure that the force required to depress the pedal is the same no matter how the pedal is adjusted, whereas Engelgau sought to provide a simpler, smaller, cheaper adjustable electronic pedal. The Rixon pedal, said the court, suffered from chafing but was not designed to solve that problem and taught nothing helpful to Engelgau's purpose. Smith, in turn, did not relate to adjustable pedals and did not necessarily go to the issue of motivation to attach the electronic control on the pedal assembly's support bracket. So interpreted, the court held, the patents would not have led a person of ordinary skill to put a sensor on an Asano-like pedal. That it might have been obvious to try that combination was likewise irrelevant. Finally, the court held that genuine issues of material fact precluded summary judgment.

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Held: The Federal Circuit addressed the obviousness question in a narrow, rigid manner that is inconsistent with § 103 and this Court's precedents. KSR provided convincing [***8] evidence that mounting an available sensor on a fixed pivot point of the Asano pedal was a design step well within the grasp of a person of ordinary skill in the relevant art and that the benefit of doing so would be obvious. Its arguments, and the record, demonstrate that the Engलगau patent's claim 4 is obvious. Pp. 11-24.

1. *Graham* provided an expansive and flexible approach to the obviousness question that is inconsistent with the way the Federal Circuit applied its TSM test here. Neither § 103's enactment nor *Graham's* analysis disturbed the Court's earlier instructions concerning the need for caution in granting a patent based on the combination of elements found in the prior art. See *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 71 S. Ct. 127, 95 L. Ed. 162, 1951 Dec. Comm'r Pat. 572. Such a combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. See, e.g., *United States v. Adams*, 383 U.S. 39, 50-52, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293. When a work is available in one field, design incentives and other market forces can prompt variations of it, either in the same field or in another. If a person [***9] of ordinary skill in the art can implement a predictable variation, and would see the benefit of doing so, § 103 likely bars its patentability. Moreover, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond that person's skill. A court must ask whether the improvement is more than the predictable use of prior-art elements according to their established functions. Following these principles may be difficult if the claimed subject matter involves more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement. To determine whether there was an apparent reason to combine the known elements in the way a patent claims, it will often be necessary to look to interrelated teachings of multiple patents; to the effects of demands known to the design community or present in the marketplace; and to the background knowledge possessed by a person having ordinary skill in the art. To facilitate review, this analysis should [***10] be made explicit. But it need not seek out precise teachings directed to the challenged claim's specific subject matter, for a court can consider the inferences and creative steps a person of ordinary skill in the art would employ. Pp. 11-14.

(b) The TSM test captures a helpful insight: A patent composed of several elements is not proved obvious merely by demonstrating that each element was, independently, known in the prior art. Although common sense directs caution as to a patent application claiming as innovation the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the art to combine the elements as the new invention does. Inventions usually rely upon building blocks long since uncovered, and claimed discoveries almost necessarily will be combinations of what, in some sense, is already known. Helpful insights, however, need not become rigid and mandatory formulas. If it is so applied, the TSM test is incompatible with this Court's precedents. The diversity of inventive pursuits and of modern technology counsels against confining the obviousness analysis [***11] by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasizing the importance of published articles and the explicit content of issued patents. In many fields there may be little discussion of obvious techniques or combinations, and market demand, rather than scientific literature, may often drive design trends. Granting patent protection to advances that would occur in the ordinary course without real innovation retards progress and may, for patents combining previously known elements, deprive prior inventions of their value or utility. Since the TSM test was devised, the Federal Circuit doubtless has applied it in accord with these principles in many cases. There is no necessary inconsistency between the test and the *Graham* analysis. But a court errs where, as here, it transforms general principle into a rigid rule limiting the obviousness inquiry. Pp. 14-15.

(c) The flaws in the Federal Circuit's analysis relate mostly to its narrow conception of the obviousness inquiry consequent in its application of the TSM test. The Circuit first erred in holding that courts and patent examiners should look only to the problem the patentee was trying [***12] to solve. Under the correct analysis, any need or problem known in the field and addressed by the patent can provide a reason for combining the elements in the manner claimed. Second, the appeals court erred in assuming that a person of ordinary skill in the art attempting to solve a problem will be led only to those prior art elements designed to solve the same problem. The court wrongly concluded that because Asano's primary purpose was solving the constant ratio problem, an inventor considering how to put a sensor on an adjustable pedal would have no reason to consider putting it on the Asano pedal. It is common sense that familiar items may have obvious uses beyond their primary purposes, and a person of ordinary skill often will be able to fit the teach-

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ings of multiple patents together like pieces of a puzzle. Regardless of Asano's primary purpose, it provided an obvious example of an adjustable pedal with a fixed pivot point, and the prior art was replete with patents indicating that such a point was an ideal mount for a sensor. Third, the court erred in concluding that a patent claim cannot be proved obvious merely by showing that the combination of elements was obvious to try. [***13] When there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill in the art has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. Finally, the court drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias. Rigid preventative rules that deny recourse to common sense are neither necessary under, nor consistent with, this Court's case law. Pp. 15-18.

2. Application of the foregoing standards demonstrates that claim 4 is obvious. Pp. 18-23.

(a) The Court rejects Teleflex's argument that the Asano pivot mechanism's design prevents its combination with a sensor in the manner claim 4 describes. This argument was not raised before the District Court, and it is unclear whether it was raised before the Federal Circuit. Given the significance of the District Court's finding that combining Asano with a pivot-mounted pedal position sensor fell within claim 4's scope, it is apparent that Teleflex would [***14] have made clearer challenges if it intended to preserve this claim. Its failure to clearly raise the argument, and the appeals court's silence on the issue, lead this Court to accept the District Court's conclusion. Pp. 18-20.

(b) The District Court correctly concluded that when Engelgau designed the claim 4 subject matter, it was obvious to a person of ordinary skill in the art to combine Asano with a pivot-mounted pedal position sensor. There then was a marketplace creating a strong incentive to convert mechanical pedals to electronic pedals, and the prior art taught a number of methods for doing so. The Federal Circuit considered the issue too narrowly by, in effect, asking whether a pedal designer writing on a blank slate would have chosen both Asano and a modular sensor similar to the ones used in the Chevrolet trucks and disclosed in the '068 patent. The proper question was whether a pedal designer of ordinary skill in the art, facing the wide range of needs created by developments in the field, would have seen an obvious benefit to upgrading Asano with a sensor. For such a designer starting with Asano, the question was where to attach the sensor.

The '936 patent taught [***15] the utility of putting the sensor on the pedal device. Smith, in turn, explained not to put the sensor on the pedal footpad, but instead on the structure. And from Rixon's known wire-chafing problems, and Smith's teaching that the pedal assemblies must not precipitate any motion in the connecting wires, the designer would know to place the sensor on a non-moving part of the pedal structure. The most obvious such point is a pivot point. The designer, accordingly, would follow Smith in mounting the sensor there. Just as it was possible to begin with the objective to upgrade Asano to work with a computer-controlled throttle, so too was it possible to take an adjustable electronic pedal like Rixon and seek an improvement that would avoid the wire-chafing problem. Teleflex has not shown anything in the prior art that taught away from the use of Asano, nor any secondary factors to dislodge the determination that claim 4 is obvious. Pp. 20-23.

3. The Court disagrees with the Federal Circuit's holding that genuine issues of material fact precluded summary judgment. The ultimate judgment of obviousness is a legal determination. *Graham*, 383 U.S., at 17, 86 S. Ct. 684, 15 L. Ed. 2d 545. Where, as here, the [***16] prior art's content, the patent claim's scope, and the level of ordinary skill in the art are not in material dispute and the claim's obviousness is apparent, summary judgment is appropriate. P. 23.

119 Fed. Appx. 282, reversed and remanded.

COUNSEL: James W. Dabney argued the cause for petitioner.

Thomas G. Hungar argued the cause for the United States, as amicus curiae, by special leave of court.

Thomas C. Goldstein

JUDGES: KENNEDY, J., delivered the opinion for a unanimous Court.

OPINION BY: KENNEDY

OPINION:

[**714] [*1734] JUSTICE KENNEDY delivered the opinion of the Court.

Teleflex Incorporated and its subsidiary Technology Holding Company -- both referred to here as Teleflex -- sued KSR International Company for patent infringement. The patent at issue, *United States Patent No. 6,237,565 B1*, is entitled "Adjustable Pedal Assembly With Electronic Throttle Control." Supplemental App. 1.

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The patentee is Steven J. Engelgau, and the patent is referred to as "the Engelgau patent." Teleflex holds the exclusive license to the patent.

Claim 4 of the Engelgau patent describes a mechanism for combining an electronic sensor with an adjustable automobile pedal so the pedal's position can be transmitted to a computer that controls the throttle in the vehicle's engine. When Teleflex accused KSR of infringing the Engelgau patent by adding an electronic sensor to one of KSR's previously [***17] designed pedals, KSR countered that claim 4 was invalid under the Patent Act, 35 U.S.C. § 103, because its subject matter was obvious.

Section 103 forbids issuance of a patent when "the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having [**715] ordinary skill in the art to which said subject matter pertains."

In *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 86 S. Ct. 684, 15 L. Ed. 2d 545 (1966), the Court set out a framework for applying the statutory language of § 103, language itself based on the logic of the earlier decision in *Hotchkiss v. Greenwood*, 52 U.S. 248, 11 How. 248, 13 L. Ed. 683 (1851), and its progeny. See 383 U.S., at 15-17, 86 S. Ct. 684, 15 L. Ed. 2d 545. The analysis is objective:

"Under § 103, the scope and content of the prior art are to be determined; differences between the prior art and the claims at issue are to be ascertained; and the level of ordinary skill in the pertinent art resolved. Against this background the obviousness or nonobviousness of the subject matter is determined. Such secondary considerations [***18] as commercial success, long felt but unsolved needs, failure of others, etc., might be utilized to give light to the circumstances surrounding the origin of the subject matter sought to be patented." *Id.*, at 17-18, 86 S. Ct. 684, 15 L. Ed. 2d 545.

While the sequence of these questions might be reordered in any particular case, the factors continue to define the inquiry that controls. If a court, or patent examiner, conducts this analysis and concludes the claimed subject matter was obvious, the claim is invalid under § 103.

Seeking to resolve the question of obviousness with more uniformity and consistency, the Court of Appeals

for the Federal Circuit has employed an approach referred to by the parties as the "teaching, suggestion, or motivation" test (TSM test), under which a patent claim is only proved obvious if "some motivation or suggestion to combine the prior art teachings" can be found in the prior art, the nature of the problem, or the knowledge of a person having ordinary skill in the art. See, e.g., *Al-Site Corp. v. VSI Int'l, Inc.*, 174 F.3d 1308, 1323-1324 (CA Fed. 1999). KSR challenges that [*1735] test, or at least its application in this case. See 119 Fed. Appx. 282, 286-290 (CA Fed. 2005). [***19] Because the Court of Appeals addressed the question of obviousness in a manner contrary to § 103 and our precedents, we granted certiorari, 547 U.S. , 126 S. Ct. 2965, 165 L. Ed. 2d 949 (2006). We now reverse.

I

A

In car engines without computer-controlled throttles, the accelerator pedal interacts with the throttle via cable or other mechanical link. The pedal arm acts as a lever rotating around a pivot point. In a cable-actuated throttle control the rotation caused by pushing down the pedal pulls a cable, which in turn pulls open valves in the carburetor or fuel injection unit. The wider the valves open, the more fuel and air are released, causing combustion to increase and the car to accelerate. When the driver takes his foot off the pedal, the opposite occurs as the cable is released and the valves slide closed.

In the 1990's it became more common to install computers in cars to control engine operation. Computer-controlled throttles open and close valves in response to electronic signals, not through force transferred from the pedal by a mechanical link. Constant, delicate adjustments of air and fuel mixture are possible. The computer's rapid processing of factors beyond the pedal's position improves [***20] [**716] fuel efficiency and engine performance.

For a computer-controlled throttle to respond to a driver's operation of the car, the computer must know what is happening with the pedal. A cable or mechanical link does not suffice for this purpose; at some point, an electronic sensor is necessary to translate the mechanical operation into digital data the computer can understand.

Before discussing sensors further we turn to the mechanical design of the pedal itself. In the traditional design a pedal can be pushed down or released but cannot have its position in the footwell adjusted by sliding the pedal forward or back. As a result, a driver who wishes to be closer or farther from the pedal must either reposition himself in the driver's seat or move the seat in some way. In cars with deep footwells these are imperfect solutions for drivers of smaller stature. To solve the prob-

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lem, inventors, beginning in the 1970's, designed pedals that could be adjusted to change their location in the footwell. Important for this case are two adjustable pedals disclosed in *U.S. Patent Nos. 5,010,782* (filed July 28, 1989) (Asano) and *5,460,061* (filed Sept. 17, 1993) (Redding). The Asano patent reveals a [***21] support structure that houses the pedal so that even when the pedal location is adjusted relative to the driver, one of the pedal's pivot points stays fixed. The pedal is also designed so that the force necessary to push the pedal down is the same regardless of adjustments to its location. The Redding patent reveals a different, sliding mechanism where both the pedal and the pivot point are adjusted.

We return to sensors. Well before Engelgau applied for his challenged patent, some inventors had obtained patents involving electronic pedal sensors for computer-controlled throttles. These inventions, such as the device disclosed in *U.S. Patent No. 5,241,936* (filed Sept. 9, 1991) ('936), taught that it was preferable to detect the pedal's position in the pedal assembly, not in the engine. The '936 patent disclosed a pedal with an electronic sensor on a pivot point in the pedal assembly. *U.S. Patent No. 5,063,811* (filed July 9, 1990) (Smith) taught that to prevent the [*1736] wires connecting the sensor to the computer from chafing and wearing out, and to avoid grime and damage from the driver's foot, the sensor should be put on a fixed part of the pedal assembly rather than in or on the pedal's [***22] footpad.

In addition to patents for pedals with integrated sensors inventors obtained patents for self-contained modular sensors. A modular sensor is designed independently of a given pedal so that it can be taken off the shelf and attached to mechanical pedals of various sorts, enabling the pedals to be used in automobiles with computer-controlled throttles. One such sensor was disclosed in *U.S. Patent No. 5,385,068* (filed Dec. 18, 1992) ('068). In 1994, Chevrolet manufactured a line of trucks using modular sensors "attached to the pedal support bracket, adjacent to the pedal and engaged with the pivot shaft about which the pedal rotates in operation." 298 F. Supp. 2d 581, 589 (E.D. Mich. 2003).

The prior art contained patents involving the placement of sensors on adjustable pedals as well. For example, *U.S. Patent No. 5,819,593* (filed Aug. 17, 1995) (Rixon) discloses an adjustable pedal assembly with an [**717] electronic sensor for detecting the pedal's position. In the Rixon pedal the sensor is located in the pedal footpad. The Rixon pedal was known to suffer from wire chafing when the pedal was depressed and released.

This short account of pedal and sensor technology leads [***23] to the instant case.

B

KSR, a Canadian company, manufactures and supplies auto parts, including pedal systems. Ford Motor Company hired KSR in 1998 to supply an adjustable pedal system for various lines of automobiles with cable-actuated throttle controls. KSR developed an adjustable mechanical pedal for Ford and obtained *U.S. Patent No. 6,151,976* (filed July 16, 1999) ('976) for the design. In 2000, KSR was chosen by General Motors Corporation (GMC or GM) to supply adjustable pedal systems for Chevrolet and GMC light trucks that used engines with computer-controlled throttles. To make the '976 pedal compatible with the trucks, KSR merely took that design and added a modular sensor.

Teleflex is a rival to KSR in the design and manufacture of adjustable pedals. As noted, it is the exclusive licensee of the Engelgau patent. Engelgau filed the patent application on August 22, 2000 as a continuation of a previous application for *U.S. Patent No. 6,109,241*, which was filed on January 26, 1999. He has sworn he invented the patent's subject matter on February 14, 1998. The Engelgau patent discloses an adjustable electronic pedal described in the specification as a "simplified vehicle control [***24] pedal assembly that is less expensive, and which uses fewer parts and is easier to package within the vehicle." Engelgau, col. 2, lines 2-5, Supplemental App. 6. Claim 4 of the patent, at issue here, describes:

"A vehicle control pedal apparatus comprising:

a support adapted to be mounted to a vehicle structure;

an adjustable pedal assembly having a pedal arm moveable in fore and aft directions with respect to said support;

a pivot for pivotally supporting said adjustable pedal assembly with respect to said support and defining a pivot axis; and

an electronic control attached to said support for controlling a vehicle system;

said apparatus characterized by said electronic control being responsive to said pivot for providing a signal that corresponds to pedal arm position as said pedal arm pivots about said pivot [*1737] axis between rest and applied positions wherein the position of said pivot remains constant while said pedal arm moves in fore and aft directions with respect to said pivot." *Id.*, col. 6, lines 17-36, Supple-

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mental App. 8 (diagram numbers omitted).

We agree with the District Court that the claim discloses "a position-adjustable pedal [***25] assembly with an electronic pedal position sensor attached to the support member of the pedal assembly. Attaching the sensor to the support member allows the sensor to remain in a fixed position while the driver adjusts the pedal." 298 F. Supp. 2d, at 586-587.

Before issuing the Engelgau patent the U.S. Patent and Trademark Office (PTO) rejected one of the patent claims that was similar to, but [**718] broader than, the present claim 4. The claim did not include the requirement that the sensor be placed on a fixed pivot point. The PTO concluded the claim was an obvious combination of the prior art disclosed in Redding and Smith, explaining:

"Since the prior art references are from the field of endeavor, the purpose disclosed . . . would have been recognized in the pertinent art of Redding. Therefore it would have been obvious . . . to provide the device of Redding with the . . . means attached to a support member as taught by Smith." *Id.*, at 595.

In other words Redding provided an example of an adjustable pedal and Smith explained how to mount a sensor on a pedal's support structure, and the rejected patent claim merely put these two teachings together. [***26]

Although the broader claim was rejected, claim 4 was later allowed because it included the limitation of a fixed pivot point, which distinguished the design from Redding's. *Ibid.* Engelgau had not included Asano among the prior art references, and Asano was not mentioned in the patent's prosecution. Thus, the PTO did not have before it an adjustable pedal with a fixed pivot point. The patent issued on May 29, 2001 and was assigned to Teleflex.

Upon learning of KSR's design for GM, Teleflex sent a warning letter informing KSR that its proposal would violate the Engelgau patent. "Teleflex believes that any supplier of a product that combines an adjustable pedal with an electronic throttle control necessarily employs technology covered by one or more" of Teleflex's patents. *Id.*, at 585. KSR refused to enter a royalty arrangement with Teleflex; so Teleflex sued for infringement, asserting KSR's pedal infringed the Engelgau patent and two other patents. *Ibid.* Teleflex later abandoned its claims regarding the other patents and dedi-

cated the patents to the public. The remaining contention was that KSR's pedal system for GM infringed claim 4 of the Engelgau patent. [***27] Teleflex has not argued that the other three claims of the patent are infringed by KSR's pedal, nor has Teleflex argued that the mechanical adjustable pedal designed by KSR for Ford infringed any of its patents.

C

The District Court granted summary judgment in KSR's favor. After reviewing the pertinent history of pedal design, the scope of the Engelgau patent, and the relevant prior art, the court considered the validity of the contested claim. By direction of 35 U.S.C. § 282, an issued patent is presumed valid. The District Court applied *Graham's* framework to determine whether under summary-judgment standards KSR had overcome the presumption and demonstrated that claim 4 was obvious in light of the prior art in existence when [**1738] the claimed subject matter was invented. See § 102(a).

The District Court determined, in light of the expert testimony and the parties' stipulations, that the level of ordinary skill in pedal design was "an undergraduate degree in mechanical engineering (or an equivalent amount of industry experience) [and] familiarity with pedal control systems for vehicles." 298 F. Supp. 2d, at 590. The court then set forth the [***28] relevant prior art, including the patents and pedal designs described above.

[**719] Following *Graham's* direction, the court compared the teachings of the prior art to the claims of Engelgau. It found "little difference." 298 F. Supp. 2d, at 590. Asano taught everything contained in claim 4 except the use of a sensor to detect the pedal's position and transmit it to the computer controlling the throttle. That additional aspect was revealed in sources such as the '068 patent and the sensors used by Chevrolet.

Under the controlling cases from the Court of Appeals for the Federal Circuit, however, the District Court was not permitted to stop there. The court was required also to apply the TSM test. The District Court held KSR had satisfied the test. It reasoned (1) the state of the industry would lead inevitably to combinations of electronic sensors and adjustable pedals, (2) Rixon provided the basis for these developments, and (3) Smith taught a solution to the wire chafing problems in Rixon, namely locating the sensor on the fixed structure of the pedal. This could lead to the combination of Asano, or a pedal like it, with a pedal position sensor.

The conclusion that the [***29] Engelgau design was obvious was supported, in the District Court's view, by the PTO's rejection of the broader version of claim 4. Had Engelgau included Asano in his patent application,

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it reasoned, the PTO would have found claim 4 to be an obvious combination of Asano and Smith, as it had found the broader version an obvious combination of Redding and Smith. As a final matter, the District Court held that the secondary factor of Teleflex's commercial success with pedals based on Engelgau's design did not alter its conclusion. The District Court granted summary judgment for KSR.

With principal reliance on the TSM test, the Court of Appeals reversed. It ruled the District Court had not been strict enough in applying the test, having failed to make "findings as to the specific understanding or principle within the knowledge of a skilled artisan that would have motivated one with no knowledge of [the] invention' . . . to attach an electronic control to the support bracket of the Asano assembly." 119 Fed. Appx., at 288 (brackets in original) (quoting *In re Kotzab*, 217 F.3d 1365, 1371 (CA Fed. 2000)). The Court of Appeals held that the District Court was [***30] incorrect that the nature of the problem to be solved satisfied this requirement because unless the "prior art references addressed the precise problem that the patentee was trying to solve," the problem would not motivate an inventor to look at those references. 119 Fed. Appx., at 288.

Here, the Court of Appeals found, the Asano pedal was designed to solve the "constant ratio problem" -- that is, to ensure that the force required to depress the pedal is the same no matter how the pedal is adjusted -- whereas Engelgau sought to provide a simpler, smaller, cheaper adjustable electronic pedal. *Ibid.* As for Rixon, the court explained, that pedal suffered from the problem of wire chafing but was not designed to solve it. In the court's view Rixon did not teach anything helpful to Engelgau's purpose. Smith, in turn, did not relate to adjustable pedals and did not "necessarily go to the issue of motivation [*1739] to attach the electronic control on the support bracket of the pedal assembly." *Ibid.* When the patents were interpreted in this way, the Court of Appeals held, they would not have led a person of ordinary skill to put a sensor on the sort of pedal described in Asano. [***31]

[**720] That it might have been obvious to try the combination of Asano and a sensor was likewise irrelevant, in the court's view, because " 'obvious to try' has long been held not to constitute obviousness." *Id.*, at 289 (quoting *In re Deuel*, 51 F.3d 1552, 1559 (CA Fed. 1995)).

The Court of Appeals also faulted the District Court's consideration of the PTO's rejection of the broader version of claim 4. The District Court's role, the Court of Appeals explained, was not to speculate regarding what the PTO might have done had the Engelgau patent mentioned Asano. Rather, the court held, the Dis-

trict Court was obliged first to presume that the issued patent was valid and then to render its own independent judgment of obviousness based on a review of the prior art. The fact that the PTO had rejected the broader version of claim 4, the Court of Appeals said, had no place in that analysis.

The Court of Appeals further held that genuine issues of material fact precluded summary judgment. Teleflex had proffered statements from one expert that claim 4 "was a simple, elegant, and novel combination of features," 119 Fed. Appx., at 290, compared to Rixon, [***32] and from another expert that claim 4 was nonobvious because, unlike in Rixon, the sensor was mounted on the support bracket rather than the pedal itself. This evidence, the court concluded, sufficed to require a trial.

II

A

We begin by rejecting the rigid approach of the Court of Appeals. Throughout this Court's engagement with the question of obviousness, our cases have set forth an expansive and flexible approach inconsistent with the way the Court of Appeals applied its TSM test here. To be sure, *Graham* recognized the need for "uniformity and definiteness." 383 U.S., at 18, 86 S. Ct. 684, 15 L. Ed. 2d 545. Yet the principles laid down in *Graham* reaffirmed the "functional approach" of *Hotchkiss*, 52 U.S. 248, 11 How. 248, 13 L. Ed. 683. See 383 U.S., at 12, 86 S. Ct. 684, 15 L. Ed. 2d 545. To this end, *Graham* set forth a broad inquiry and invited courts, where appropriate, to look at any secondary considerations that would prove instructive. *Id.*, at 17, 86 S. Ct. 684, 15 L. Ed. 2d 545.

Neither the enactment of § 103 nor the analysis in *Graham* disturbed this Court's earlier instructions concerning the need for caution in granting a patent based on the combination of elements found in the prior art. For over a half century, [***33] the Court has held that a "patent for a combination which only unites old elements with no change in their respective functions . . . obviously withdraws what is already known into the field of its monopoly and diminishes the resources available to skillful men." *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 152, 71 S. Ct. 127, 95 L. Ed. 162, 1951 Dec. Comm'r Pat. 572 (1950). This is a principal reason for declining to allow patents for what is obvious. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. Three cases decided after *Graham* illustrate the application of this doctrine.

In *United States v. Adams*, 383 U.S. 39, 40, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293 (1966), a com-

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panion case to *Graham*, the Court considered the obviousness of a "wet battery" that varied from [**721] prior designs in two ways: [*1740] It contained water, rather than the acids conventionally employed in storage batteries; and its electrodes were magnesium and cuprous chloride, rather than zinc and silver chloride. The Court recognized that when a patent claims a structure already known in the prior art that is altered by the mere substitution of one [***34] element for another known in the field, the combination must do more than yield a predictable result. 383 U.S., at 50-51, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293. It nevertheless rejected the Government's claim that Adams's battery was obvious. The Court relied upon the corollary principle that when the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. *Id.*, at 51-52, 86 S. Ct. 708, 15 L. Ed. 2d 572, 174 Ct. Cl. 1293. When Adams designed his battery, the prior art warned that risks were involved in using the types of electrodes he employed. The fact that the elements worked together in an unexpected and fruitful manner supported the conclusion that Adams's design was not obvious to those skilled in the art.

In *Anderson's-Black Rock, Inc. v. Pavement Salvage Co.*, 396 U.S. 57, 90 S. Ct. 305, 24 L. Ed. 2d 258 (1969), the Court elaborated on this approach. The subject matter of the patent before the Court was a device combining two pre-existing elements: a radiant-heat burner and a paving machine. The device, the Court concluded, did not create some new synergy: The radiant-heat burner functioned just as a burner was expected to function; and the paving machine did [***35] the same. The two in combination did no more than they would in separate, sequential operation. *Id.*, at 60-62, 90 S. Ct. 305, 24 L. Ed. 2d 258. In those circumstances, "while the combination of old elements performed a useful function, it added nothing to the nature and quality of the radiant-heat burner already patented," and the patent failed under § 103. *Id.*, at 62, 90 S. Ct. 305, 24 L. Ed. 2d 258 (footnote omitted).

Finally, in *Sakraida v. AG Pro, Inc.*, 425 U.S. 273, 96 S. Ct. 1532, 47 L. Ed. 2d 784 (1976), the Court derived from the precedents the conclusion that when a patent "simply arranges old elements with each performing the same function it had been known to perform" and yields no more than one would expect from such an arrangement, the combination is obvious. *Id.*, at 282, 96 S. Ct. 1532, 47 L. Ed. 2d 784.

The principles underlying these cases are instructive when the question is whether a patent claiming the combination of elements of prior art is obvious. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, ei-

ther in the same field or a different one. If a person of ordinary skill can implement a predictable variation, § 103 likely bars its patentability. For [***36] the same reason, if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill. *Sakraida* and *Anderson's-Black Rock* are illustrative -- a court must ask whether the improvement is more than the predictable use of prior art elements according to their established functions.

Following these principles may be [**722] more difficult in other cases than it is here because the claimed subject matter may involve more than the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for the improvement. Often, it will be necessary for a court to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having [*1741] ordinary skill in the art, all in order to determine whether there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis [***37] should be made explicit. See *In re Kahn*, 441 F.3d 977, 988 (CA Fed. 2006) ("Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness"). As our precedents make clear, however, the analysis need not seek out precise teachings directed to the specific subject matter of the challenged claim, for a court can take account of the inferences and creative steps that a person of ordinary skill in the art would employ.

B

When it first established the requirement of demonstrating a teaching, suggestion, or motivation to combine known elements in order to show that the combination is obvious, the Court of Customs and Patent Appeals captured a helpful insight. See *Application of Bergel*, 292 F.2d 955, 956-957, 48 C.C.P.A. 1102, 1961 Dec. Com-m'r Pat. 504 (1961). As is clear from cases such as *Adams*, a patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. Although common sense directs one to look with care at a patent application that claims as innovation [***38] the combination of two known devices according to their established functions, it can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the

way the claimed new invention does. This is so because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.

Helpful insights, however, need not become rigid and mandatory formulas; and when it is so applied, the TSM test is incompatible with our precedents. The obviousness analysis cannot be confined by a formalistic conception of the words teaching, suggestion, and motivation, or by overemphasis on the importance of published articles and the explicit content of issued patents. The diversity of inventive pursuits and of modern technology counsels against limiting the analysis in this way. In many fields it may be that there is little discussion of obvious techniques or combinations, and it often may be the case that market demand, rather than scientific literature, will drive design trends. Granting patent protection [***39] to advances that would occur in the ordinary course without real innovation retards progress and may, in the case of patents combining previously known elements, deprive prior inventions of their value or utility.

In the years since the Court of Customs and Patent Appeals set forth the [**723] essence of the TSM test, the Court of Appeals no doubt has applied the test in accord with these principles in many cases. There is no necessary inconsistency between the idea underlying the TSM test and the *Graham* analysis. But when a court transforms the general principle into a rigid rule that limits the obviousness inquiry, as the Court of Appeals did here, it errs.

C

The flaws in the analysis of the Court of Appeals relate for the most part to the court's narrow conception of the obviousness inquiry reflected in its application of the TSM test. In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the [*1742] patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under § 103. One of the ways in which a patent's subject matter can be proved obvious is [***40] by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims.

The first error of the Court of Appeals in this case was to foreclose this reasoning by holding that courts and patent examiners should look only to the problem the patentee was trying to solve. *119 Fed. Appx.*, at 288. The Court of Appeals failed to recognize that the problem motivating the patentee may be only one of many addressed by the patent's subject matter. The question is not whether the combination was obvious to the patentee but

whether the combination was obvious to a person with ordinary skill in the art. Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

The second error of the Court of Appeals lay in its assumption that a person of ordinary skill attempting to solve a problem will be led only to those elements of prior art designed to solve the same problem. *Ibid.* The primary purpose of Asano was solving the constant ratio problem; so, the court concluded, [***41] an inventor considering how to put a sensor on an adjustable pedal would have no reason to consider putting it on the Asano pedal. *Ibid.* Common sense teaches, however, that familiar items may have obvious uses beyond their primary purposes, and in many cases a person of ordinary skill will be able to fit the teachings of multiple patents together like pieces of a puzzle. Regardless of Asano's primary purpose, the design provided an obvious example of an adjustable pedal with a fixed pivot point; and the prior art was replete with patents indicating that a fixed pivot point was an ideal mount for a sensor. The idea that a designer hoping to make an adjustable electronic pedal would ignore Asano because Asano was designed to solve the constant ratio problem makes little sense. A person of ordinary skill is also a person of ordinary creativity, not an automaton.

The same constricted analysis led the Court of Appeals to conclude, in error, that a patent claim cannot be proved obvious merely by showing that the combination of elements was "obvious to try." *Id.*, at 289 (internal quotation marks omitted). When there is a design need or market pressure to solve a problem [***42] and there are a finite number of identified, predictable [**724] solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp. If this leads to the anticipated success, it is likely the product not of innovation but of ordinary skill and common sense. In that instance the fact that a combination was obvious to try might show that it was obvious under § 103.

The Court of Appeals, finally, drew the wrong conclusion from the risk of courts and patent examiners falling prey to hindsight bias. A factfinder should be aware, of course, of the distortion caused by hindsight bias and must be cautious of arguments reliant upon *ex post* reasoning. See *Graham*, 383 U.S., at 36, 86 S. Ct. 684, 15 L. Ed. 2d 545 (warning against a "temptation to read into the prior art the teachings of the invention in issue" and instructing courts to "guard against slipping into the use of hindsight" (quoting *Monroe Auto Equipment Co. v. Heckethorn Mfg. & Supply Co.*, 332 F.2d 406, 412 (CA6 1964))). Rigid preventative rules that deny factfinders

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recourse to common sense, however, are [*1743] neither necessary under our case law nor consistent with it.

We note the [***43] Court of Appeals has since elaborated a broader conception of the TSM test than was applied in the instant matter. See, e.g., *DyStar Textilfarben GmbH & Co. Deutschland KG v. C. H. Patrick Co.*, 464 F.3d 1356, 1367 (2006) ("Our suggestion test is in actuality quite flexible and not only permits, but *requires*, consideration of common knowledge and common sense"); *Alza Corp. v. Mylan Labs., Inc.*, 464 F.3d 1286, 1291 (2006) ("There is flexibility in our obviousness jurisprudence because a motivation may be found *implicitly* in the prior art. We do not have a rigid test that requires an actual teaching to combine . . ."). Those decisions, of course, are not now before us and do not correct the errors of law made by the Court of Appeals in this case. The extent to which they may describe an analysis more consistent with our earlier precedents and our decision here is a matter for the Court of Appeals to consider in its future cases. What we hold is that the fundamental misunderstandings identified above led the Court of Appeals in this case to apply a test inconsistent with our patent law decisions.

III

When we apply the standards we have [***44] explained to the instant facts, claim 4 must be found obvious. We agree with and adopt the District Court's recitation of the relevant prior art and its determination of the level of ordinary skill in the field. As did the District Court, we see little difference between the teachings of Asano and Smith and the adjustable electronic pedal disclosed in claim 4 of the Engelgau patent. A person having ordinary skill in the art could have combined Asano with a pedal position sensor in a fashion encompassed by claim 4, and would have seen the benefits of doing so.

A

Teleflex argues in passing that the Asano pedal cannot be combined with a sensor in the manner described by claim 4 because of the design of Asano's pivot mechanisms. See Brief for Respondents 48-49, and n. 17. Therefore, Teleflex reasons, even if adding a sensor to Asano was obvious, that does not establish that claim 4 encompasses obvious subject matter. This argument was not, however, [**725] raised before the District Court. There Teleflex was content to assert only that the problem motivating the invention claimed by the Engelgau patent would not lead to the solution of combining of Asano with a sensor. See Teleflex's Response [***45] to KSR's Motion for Summary Judgment of Invalidity in No. 02-74586 (ED Mich.), pp. 18-20, App. 144a-146a. It is also unclear whether the current argument was raised before the Court of Appeals, where Teleflex advanced the nonspecific, conclusory contention that combining

Asano with a sensor would not satisfy the limitations of claim 4. See Brief for Plaintiffs-Appellants in No. 04-1152 (CA Fed.), pp. 42-44. Teleflex's own expert declarations, moreover, do not support the point Teleflex now raises. See Declaration of Clark J. Radcliffe, Ph.D., Supplemental App. 204-207; Declaration of Timothy L. Andresen, *id.*, at 208-210. The only statement in either declaration that might bear on the argument is found in the Radcliffe declaration:

Asano . . . and Rixon . . . are complex mechanical linkage-based devices that are expensive to produce and assemble and difficult to package. It is exactly these difficulties with prior art designs that [Engelgau] resolves. The use of an adjustable pedal with a single pivot reflecting pedal position combined with an electronic control mounted between the [*1744] support and the adjustment assembly at that pivot was a simple, elegant, and novel combination [***46] of features in the Engelgau '565 patent." *Id.*, at 206, P16.

Read in the context of the declaration as a whole this is best interpreted to mean that Asano could not be used to solve "the problem addressed by Engelgau '565[] to provide a less expensive, more quickly assembled, and smaller package adjustable pedal assembly with electronic control." *Id.*, at 205, P10.

The District Court found that combining Asano with a pivot-mounted pedal position sensor fell within the scope of claim 4. 298 F. Supp. 2d, at 592-593. Given the significance of that finding to the District Court's judgment, it is apparent that Teleflex would have made clearer challenges to it if it intended to preserve this claim. In light of Teleflex's failure to raise the argument in a clear fashion, and the silence of the Court of Appeals on the issue, we take the District Court's conclusion on the point to be correct.

B

The District Court was correct to conclude that, as of the time Engelgau designed the subject matter in claim 4, it was obvious to a person of ordinary skill to combine Asano with a pivot-mounted pedal position sensor. There then existed a marketplace that created a strong [***47] incentive to convert mechanical pedals to electronic pedals, and the prior art taught a number of methods for achieving this advance. The Court of Appeals considered the issue too narrowly by, in effect, asking whether a pedal designer writing on a blank slate would have cho-

sen both Asano and a modular sensor similar to the ones used in the Chevrolet truckline and disclosed in the '068 patent. The District Court employed this narrow inquiry as well, though it reached the correct result nevertheless. The proper question to have asked was whether a pedal designer of ordinary skill, facing the wide range of needs created by developments in the field of endeavor, [**726] would have seen a benefit to upgrading Asano with a sensor.

In automotive design, as in many other fields, the interaction of multiple components means that changing one component often requires the others to be modified as well. Technological developments made it clear that engines using computer-controlled throttles would become standard. As a result, designers might have decided to design new pedals from scratch; but they also would have had reason to make pre-existing pedals work with the new engines. Indeed, upgrading its [***48] own pre-existing model led KSR to design the pedal now accused of infringing the Engelgau patent.

For a designer starting with Asano, the question was where to attach the sensor. The consequent legal question, then, is whether a pedal designer of ordinary skill starting with Asano would have found it obvious to put the sensor on a fixed pivot point. The prior art discussed above leads us to the conclusion that attaching the sensor where both KSR and Engelgau put it would have been obvious to a person of ordinary skill.

The '936 patent taught the utility of putting the sensor on the pedal device, not in the engine. Smith, in turn, explained to put the sensor not on the pedal's footpad but instead on its support structure. And from the known wire-chafing problems of Rixon, and Smith's teaching that "the pedal assemblies must not precipitate any motion in the connecting wires," Smith, col. 1, lines 35-37, Supplemental App. 274, the designer would know to place the sensor on a nonmoving part of the pedal structure. The most obvious nonmoving point on the structure from which a sensor can [*1745] easily detect the pedal's position is a pivot point. The designer, accordingly, would follow Smith [***49] in mounting the sensor on a pivot, thereby designing an adjustable electronic pedal covered by claim 4.

Just as it was possible to begin with the objective to upgrade Asano to work with a computer-controlled throttle, so too was it possible to take an adjustable electronic pedal like Rixon and seek an improvement that would avoid the wire-chafing problem. Following similar steps to those just explained, a designer would learn from Smith to avoid sensor movement and would come, thereby, to Asano because Asano disclosed an adjustable pedal with a fixed pivot.

Teleflex indirectly argues that the prior art taught away from attaching a sensor to Asano because Asano in its view is bulky, complex, and expensive. The only evidence Teleflex marshals in support of this argument, however, is the Radcliffe declaration, which merely indicates that Asano would not have solved Engelgau's goal of making a small, simple, and inexpensive pedal. What the declaration does not indicate is that Asano was somehow so flawed that there was no reason to upgrade it, or pedals like it, to be compatible with modern engines. Indeed, Teleflex's own declarations refute this conclusion. Dr. Radcliffe states that [***50] Rixon suffered from the same bulk and complexity as did Asano. See *id.*, at 206. Teleflex's other expert, however, explained that Rixon was itself designed by adding a sensor to a pre-existing mechanical pedal. See *id.*, at 209. If Rixon's base pedal was not too flawed to upgrade, then Dr. Radcliffe's declaration does not show Asano was either. Teleflex may have made a plausible argument that Asano is inefficient as compared [**727] to Engelgau's preferred embodiment, but to judge Asano against Engelgau would be to engage in the very hindsight bias Teleflex rightly urges must be avoided. Accordingly, Teleflex has not shown anything in the prior art that taught away from the use of Asano.

Like the District Court, finally, we conclude Teleflex has shown no secondary factors to dislodge the determination that claim 4 is obvious. Proper application of *Graham* and our other precedents to these facts therefore leads to the conclusion that claim 4 encompassed obvious subject matter. As a result, the claim fails to meet the requirement of § 103.

We need not reach the question whether the failure to disclose Asano during the prosecution of Engelgau voids the presumption of validity given [***51] to issued patents, for claim 4 is obvious despite the presumption. We nevertheless think it appropriate to note that the rationale underlying the presumption -- that the PTO, in its expertise, has approved the claim -- seems much diminished here.

IV

A separate ground the Court of Appeals gave for reversing the order for summary judgment was the existence of a dispute over an issue of material fact. We disagree with the Court of Appeals on this point as well. To the extent the court understood the *Graham* approach to exclude the possibility of summary judgment when an expert provides a conclusory affidavit addressing the question of obviousness, it misunderstood the role expert testimony plays in the analysis. In considering summary judgment on that question the district court can and should take into account expert testimony, which may resolve or keep open certain questions of fact. That is not

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the end of the issue, however. The ultimate judgment of obviousness is a legal determination. *Graham*, 383 U.S., at 17, 86 S. Ct. 684, 15 L. Ed. 2d 545. Where, as here, the content of the prior art, the scope of the patent [*1746] claim, and the level of ordinary skill in the art are not in material dispute, and [***52] the obviousness of the claim is apparent in light of these factors, summary judgment is appropriate. Nothing in the declarations proffered by Teleflex prevented the District Court from reaching the careful conclusions underlying its order for summary judgment in this case.

* * *

We build and create by bringing to the tangible and palpable reality around us new works based on instinct, simple logic, ordinary inferences, extraordinary ideas, and sometimes even genius. These advances, once part of our shared knowledge, define a new threshold from which innovation starts once more. And as progress beginning from higher levels of achievement is expected in the normal course, the results of ordinary innovation are not the subject of exclusive rights under the patent laws. Were it otherwise patents might stifle, rather than promote, the progress of useful arts. See *U.S. Const., Art. I, § 8, cl. 8*. These premises led to the bar on patents claim-

ing obvious subject matter established in *Hotchkiss* and codified in § 103. Application of the bar must not be confined within a test or formulation too constrained to serve its purpose.

KSR provided convincing evidence that mounting a modular [***53] sensor on a fixed pivot point of the Asano pedal was a design step well within the [**728] grasp of a person of ordinary skill in the relevant art. Its arguments, and the record, demonstrate that claim 4 of the Engelgau patent is obvious. In rejecting the District Court's rulings, the Court of Appeals analyzed the issue in a narrow, rigid manner inconsistent with § 103 and our precedents. The judgment of the Court of Appeals is reversed, and the case remanded for further proceedings consistent with this opinion.

It is so ordered.

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RELATED PROCEEDINGS APPENDIX

None.